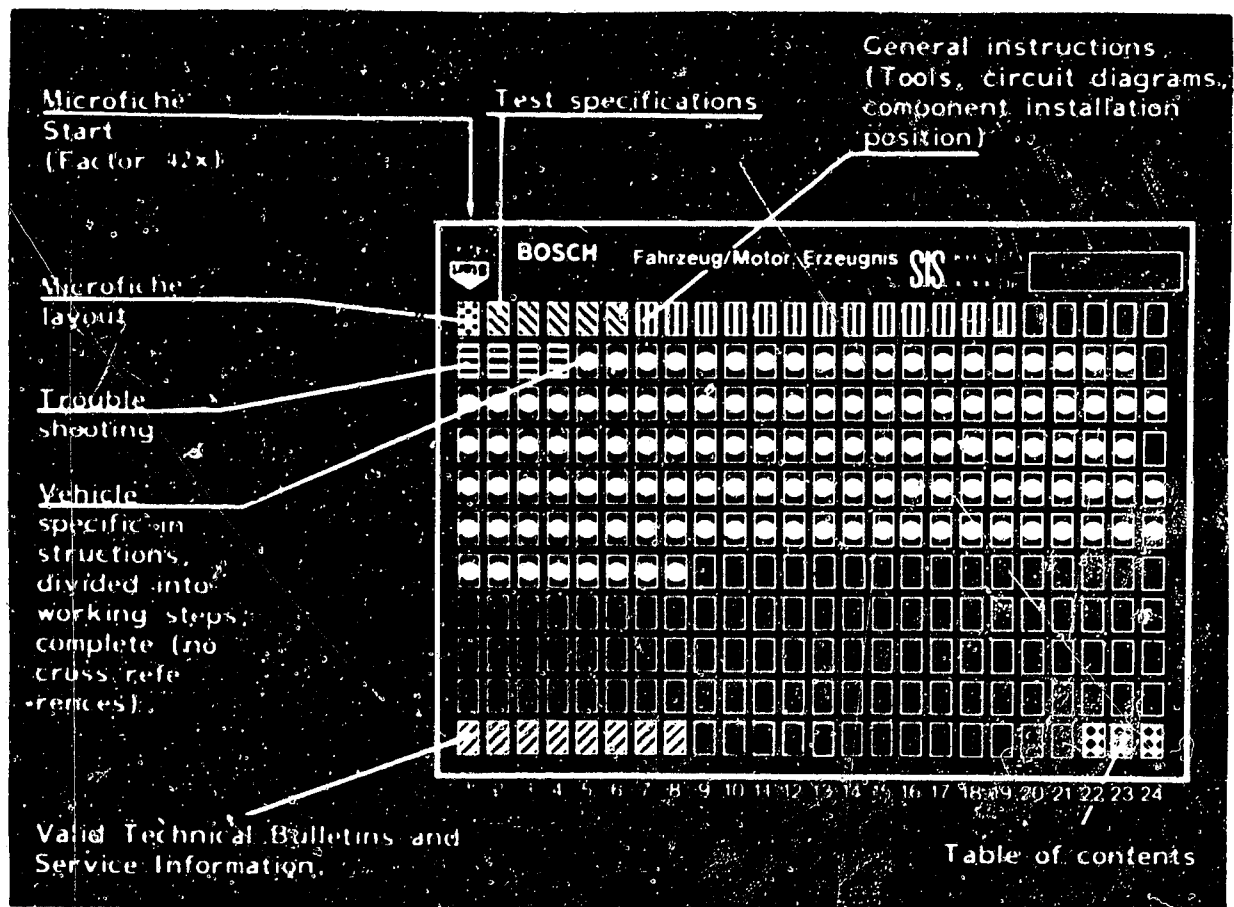


Microfiche layout



1. Read from left to right

2. Title of microfiche (appears on each coordinate)

E 16	Product/assembly/test step	
	Vehicle/engine	

Coordinate

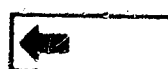
3. Limits of section



Beginning



Mid-section



End



One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar.

5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

C 6

A 1

Trouble-Shooting Plan



1. Test specifications

1.1 Electric fuel pump

B 22

Test step

Test specifications

Fuel delivery:

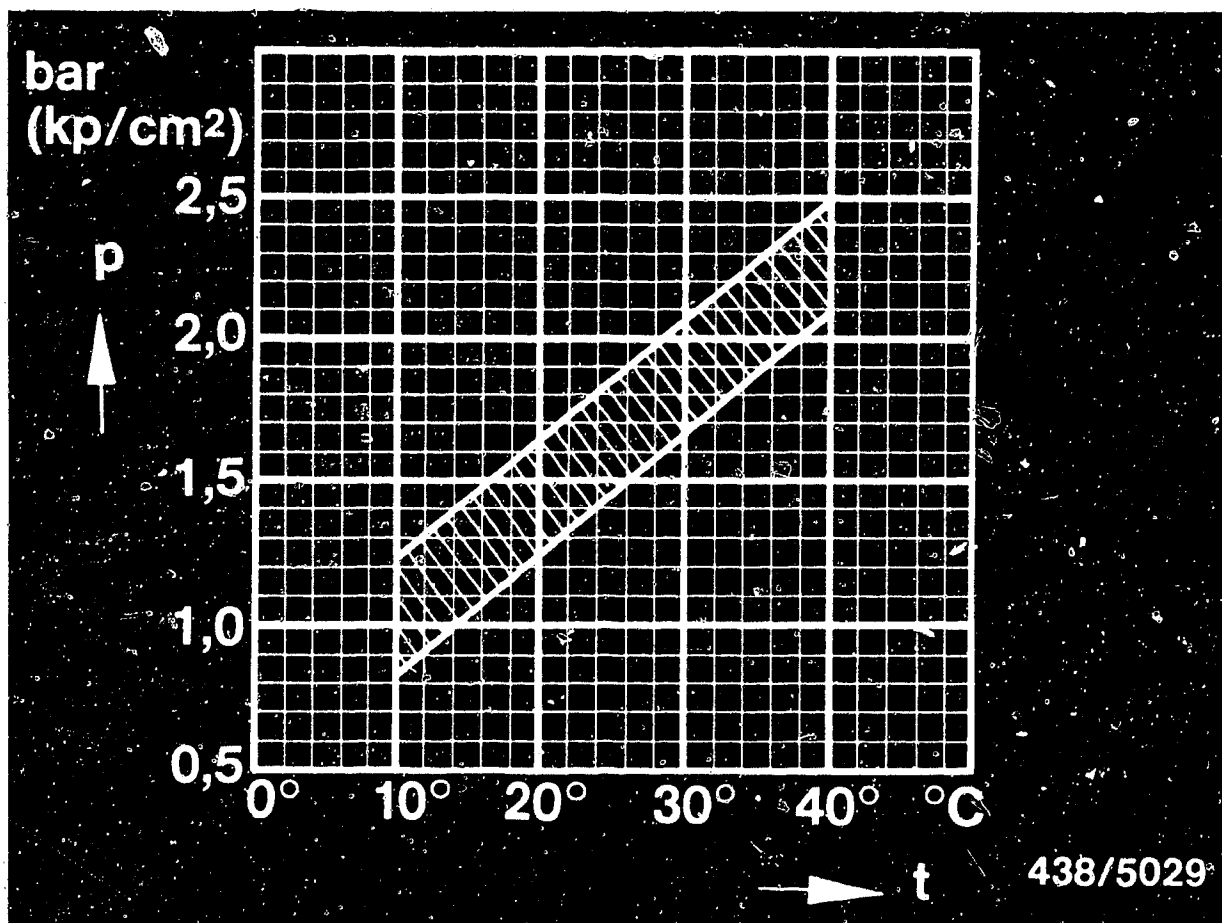
min. 750 cm³/30 s

A2

Test specifications

Saab 99, 900





p = Control pressure (gauge pressure)
t = Ambient temperature

1.2 Control pressure "cold"

Part No. of warm-up regulator: 0 438 140 020
0 438 140 111

C 13

A3

Test specifications

Saab 99, 900



Test step

Test specifications

1.3 Control pressure "warm"

Warm-up regulator

0 438 140 020

3.4...3.8 bar (3.5...3.9
kgf/cm²)

D 13

1.4 Primary pressure

Fuel distributor

0 438 100 023

Checking value

4.5...5.2 bar (4.6...5.3
kgf/cm²)

Setting value

4.7...4.9 bar (4.8...5.0
kgf/cm²)

D 4

1.5 Leak test

Minimum pressure with fuel accumulator

0 438 170 014 (1978 model):

after 10 minutes:

1.6 bar (1.7 kgf/cm²)

after 20 minutes:

1.4 bar (1.5 kgf/cm²)

Minimum pressure with fuel accumulator

0 438 170 010 (1979/1980 model):

after 10 minutes:

2.0 bar (2.1 kgf/cm²)

after 20 minutes:

1.7 bar (1.8 kgf/cm²)

Minimum pressure for fuel accumulator

0 438 170 030 (as of 1981 model)

0 438 170 047 (as of 1.84):

after 10 minutes

2.5 bar (2.6 kgf/cm²)

after 20 minutes

2.4 bar (2.5 kgf/cm²)

D 11

* Pressures in the test-specification table are given in bar (gauge pressure) and/or in kgf/cm² (gauge pressure).

A4

Test specifications

Saab 99/900



1.6 Injection valves**E5**

Part number: 0 437 502 004 up to FD 828 (1978 model)

Opening pressure: 2.5...3.6 bar (2.6...3.7 kgf/cm²)

Part number: 0 437 502 004 from FD 829 (1979 model)

Opening pressure: 2.7...3.8 bar (2.8...3.9 kgf/cm²)

Part number: 0 437 502 012 (from 1980 model)

Opening pressure: 3.0...4.1 bar (3.1...4.2 kgf/cm²)

*Pressures in the test-specification table are given in bar (gauge pressure) and/or in kgf/cm² (gauge pressure)



1.7 Fuel distributor**E15**

Comparative measurement
of fuel deliveries.

Part no. of fuel distributor:

0 438 100 023

	Setting point cm ³ /min.	Max. allowable delivery cm ³ /min.
Idle	6.0	6.8
Part load	40.0	44.0
Full load	160.0	175.0

1.8 Idle adjustment**F3**

Idle speed:

All versions: 825... 925 min⁻¹

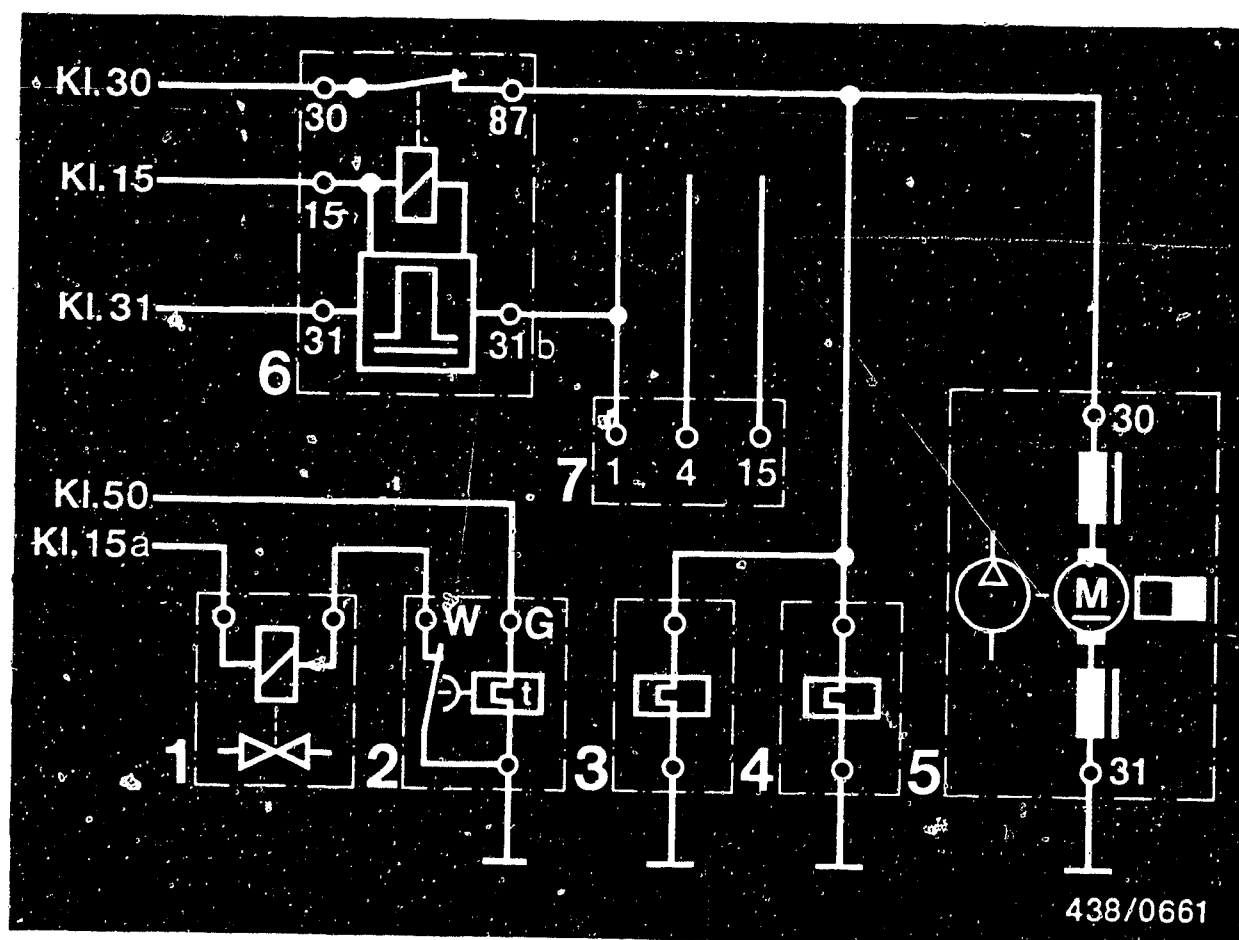
CO concentration (% by vol.):

European version

in general: 0.5...2.5 %

Sweden version: 1.0...2.0 %



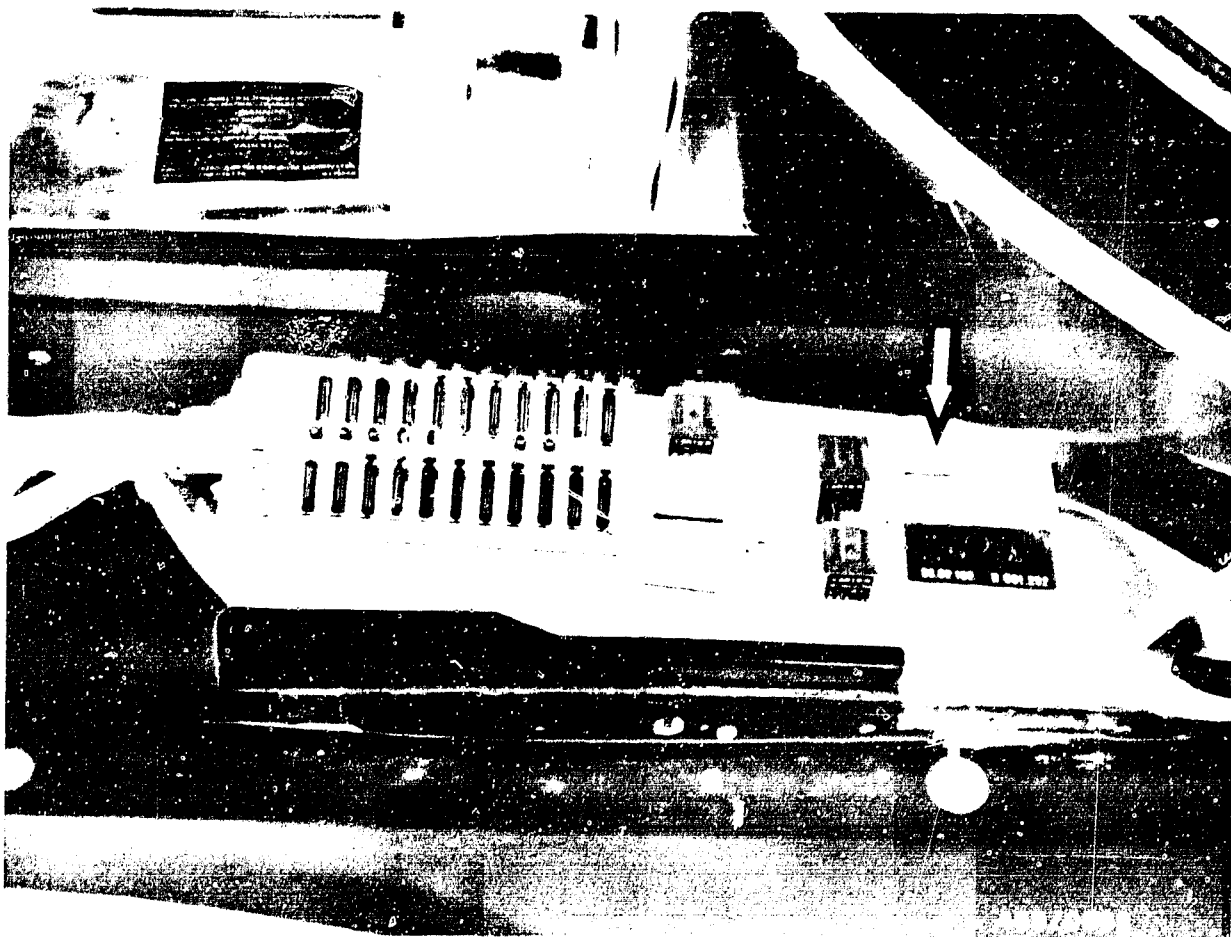


2. Electrical safety circuit

2.1 Circuit diagram

- 1 = Start valve
- 2 = Thermo-time switch
- 3 = Warm-up regulator
- 4 = Auxiliary-air device
- 5 = Electric fuel pump
- 6 = Electronic relay
- 7 = Ignition coil



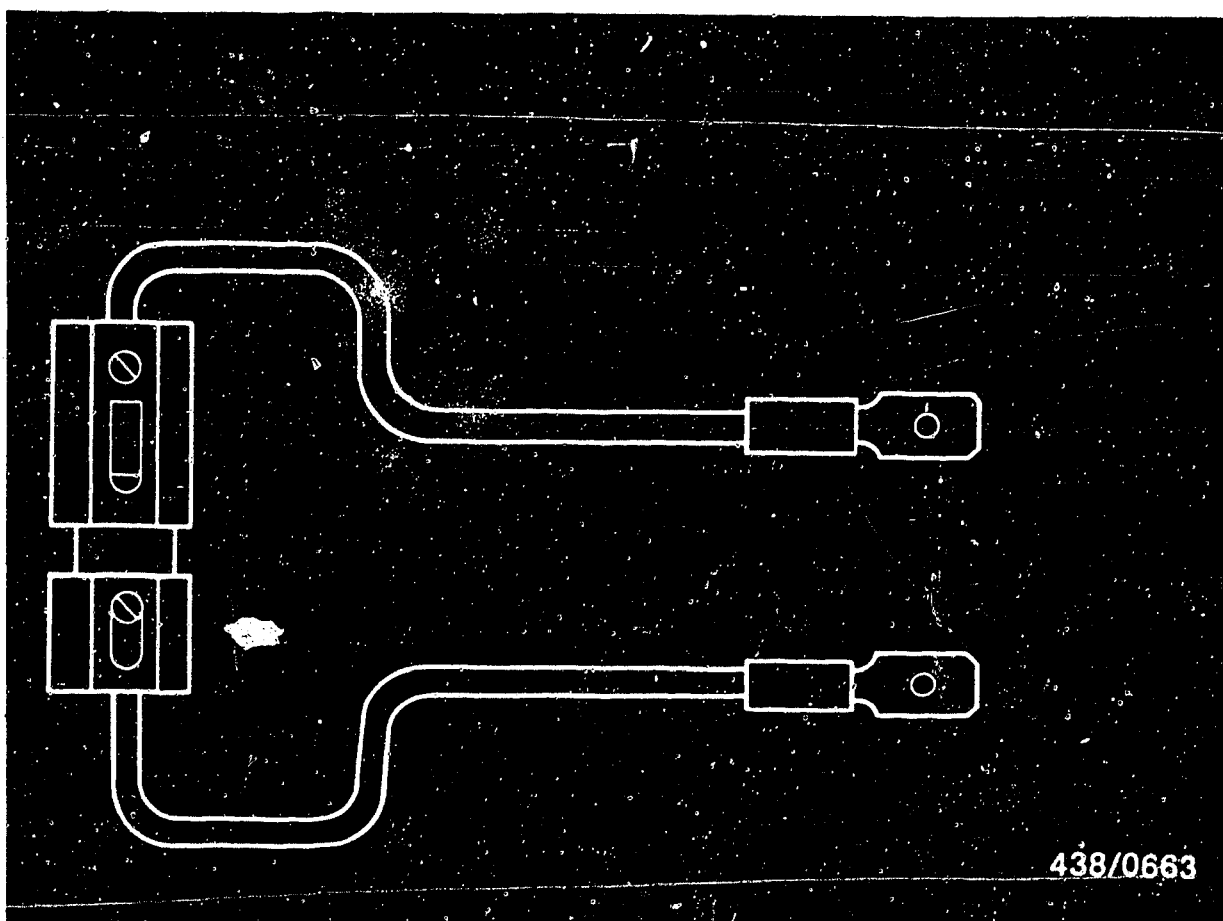


2.2 Bridging the safety circuit:

In order to carry out testing with the engine stationary, it is necessary to bridge the safety circuit.

To do this, remove the electronic relay (arrow) from the central-electrics console (above the left-hand wheel box). Using a jumper lead, bridge contacts 30 and 87 in the console.





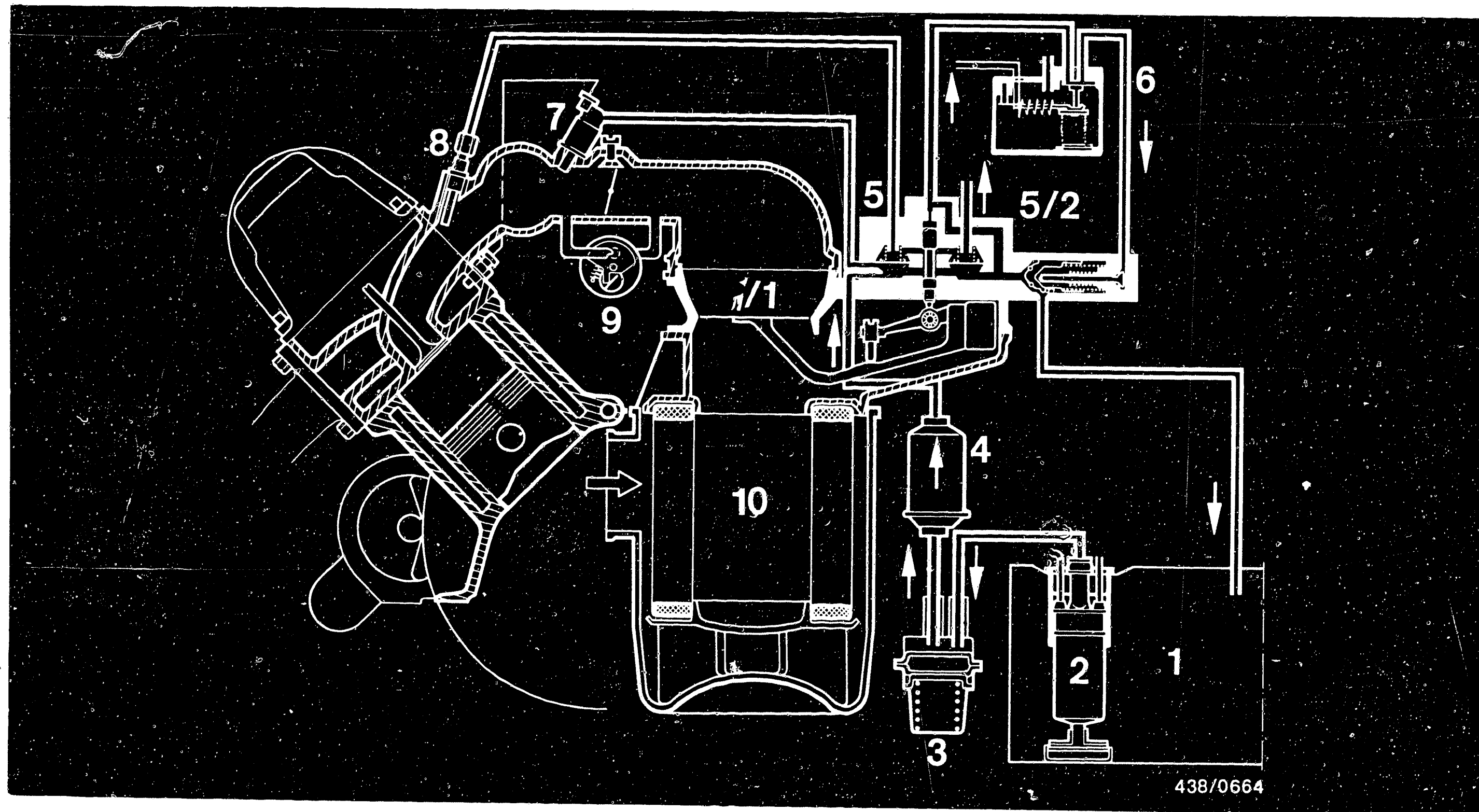
Fit the jumper lead with a fuse holder and 16 A fuse.

Bridging the contacts means that the electric fuel pump, warm-up regulator and auxiliary-air device are supplied with battery voltage.

A9

Electrical safety circuit
Saab 99/900





3. Diagram of fuel lines

- | | | |
|------------------------|--------------------------|--------------------------|
| 1 = Fuel tank | 5 = Mixture control unit | 7 = Cold-start valve |
| 2 = Electric fuel pump | 5/1 = Air-flow sensor | 8 = Injection valve |
| 3 = Fuel accumulator | 5/2 = Fuel distributor | 9 = Auxiliary-air device |
| 4 = Fuel filter | 6 = Warm-up regulator | 10 = Air filter |

A10

Diagram of fuel lines
Saab 99, 900



A11

Diagram of fuel lines
Saab 99, 900



4. General information

4.1 Introduction

This repair instruction manual refers to the Saab vehicle models with K-Jetronic:

99 EMS and 99 GLE, models 1978 to 1979
900 EMS and 900 GLE, 1979 model
900 GLI, as from 1980 model

It has been possible to group together these different model versions up to the 1979 model because they are equipped with the same engine type and there are no differences with regard to the K-Jetronic or the installation position of the components. As from the 1980 model various changes have been made on the engine, but these are only slight visible changes, and with regard to the K-Jetronic there is no difference from earlier models.

This repair manual refers only to the above-mentioned vehicles and gives a concise description of the testing and adjustment operations to be performed on the vehicle on the K-Jetronic.

All the system components are dealt with in separate working steps with the corresponding test instructions. In addition to this repair manual the appropriate testing and repair manuals will, of course, be issued for every other vehicle type equipped with the K-Jetronic.



The K-Jetronic differs from other known fuel-injection systems in terms of both construction and operation. In order to be able to carry out the testing procedures described in this manual - and therefore to be able to assess the components - the K-Jetronic and its operation should be clearly understood. The essential points of the operation and construction of the K-Jetronic are described in Technical Instruction VDT-U 3/1 En.

When trouble-shooting the K-Jetronic, it is assumed that the ignition is in order and that the engine is in proper mechanical condition.

The individual test steps of this repair manual are detailed and self-contained. This permits direct trouble-shooting without having to go through the entire test program for each fault.

The trouble-shooting chart on Coordinates B 1 - B 4 is intended to make it easier to decide which test steps have to be carried out for certain faults.

According to the symptom stated by the customer or which you yourself have determined, select the possible cause in the trouble-shooting chart. The coordinate at the end of the cause column refers to the appropriate test step with the associated test specification.

Important note:

If any fuel connections are loosened, parts removed, also on the vacuum system, always use new seals when re-connecting or re-installing.

Ensure utmost cleanliness when working on the K-Jetronic. Fuel connections must be cleaned thoroughly on the outside before opening.





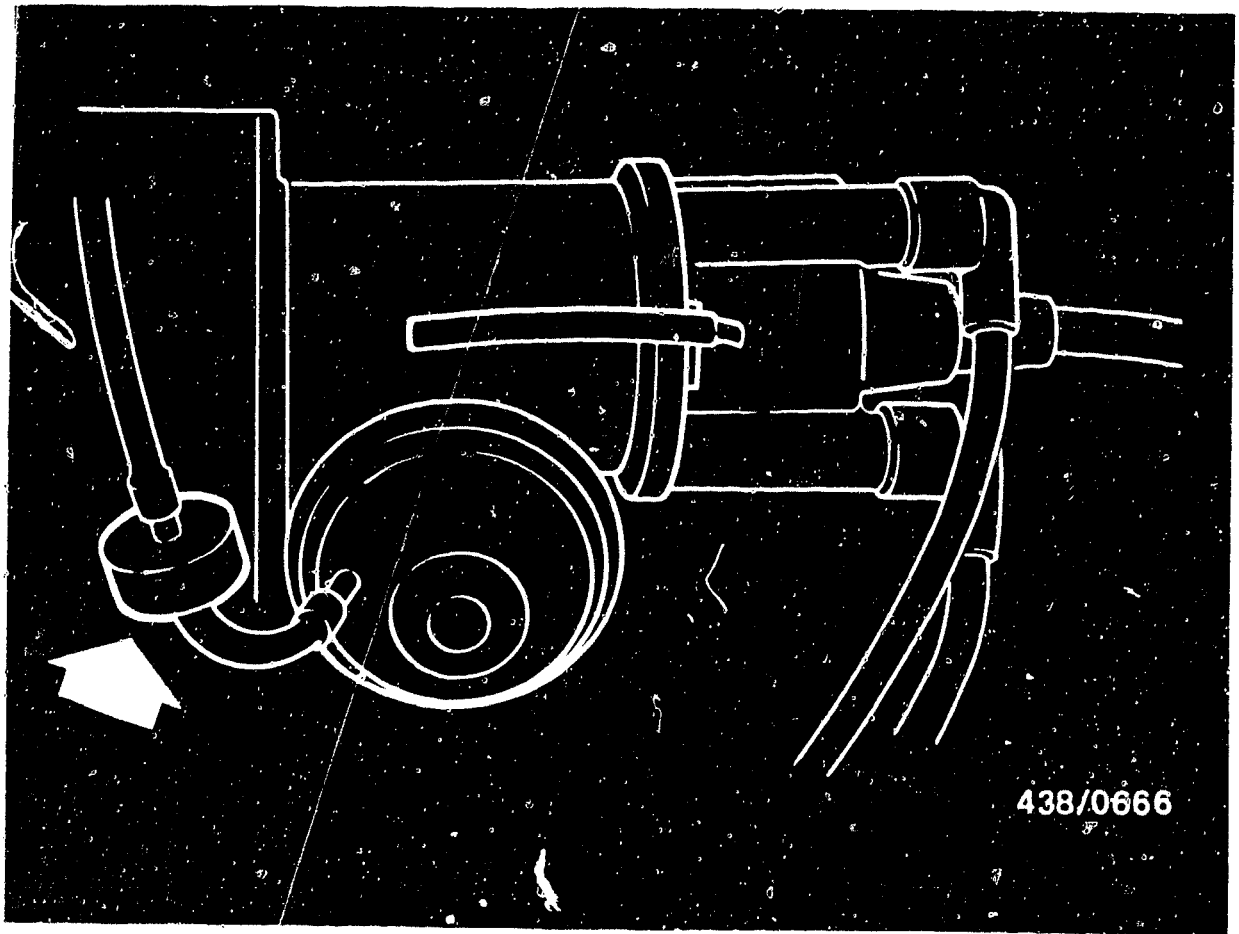
4.2 Auxiliary equipment for mixture preparation and exhaust-gas purification:

All models as from 1980 are equipped with a throttle-valve closing damper (arrow).

Closing time of the throttle valve with correct adjustment of the damper, correct idle adjustment and with engine at normal operating temperature:

from $n = 3000 \text{ min}^{-1}$ to $n = 875 \text{ min}^{-1}$: 3...6 seconds





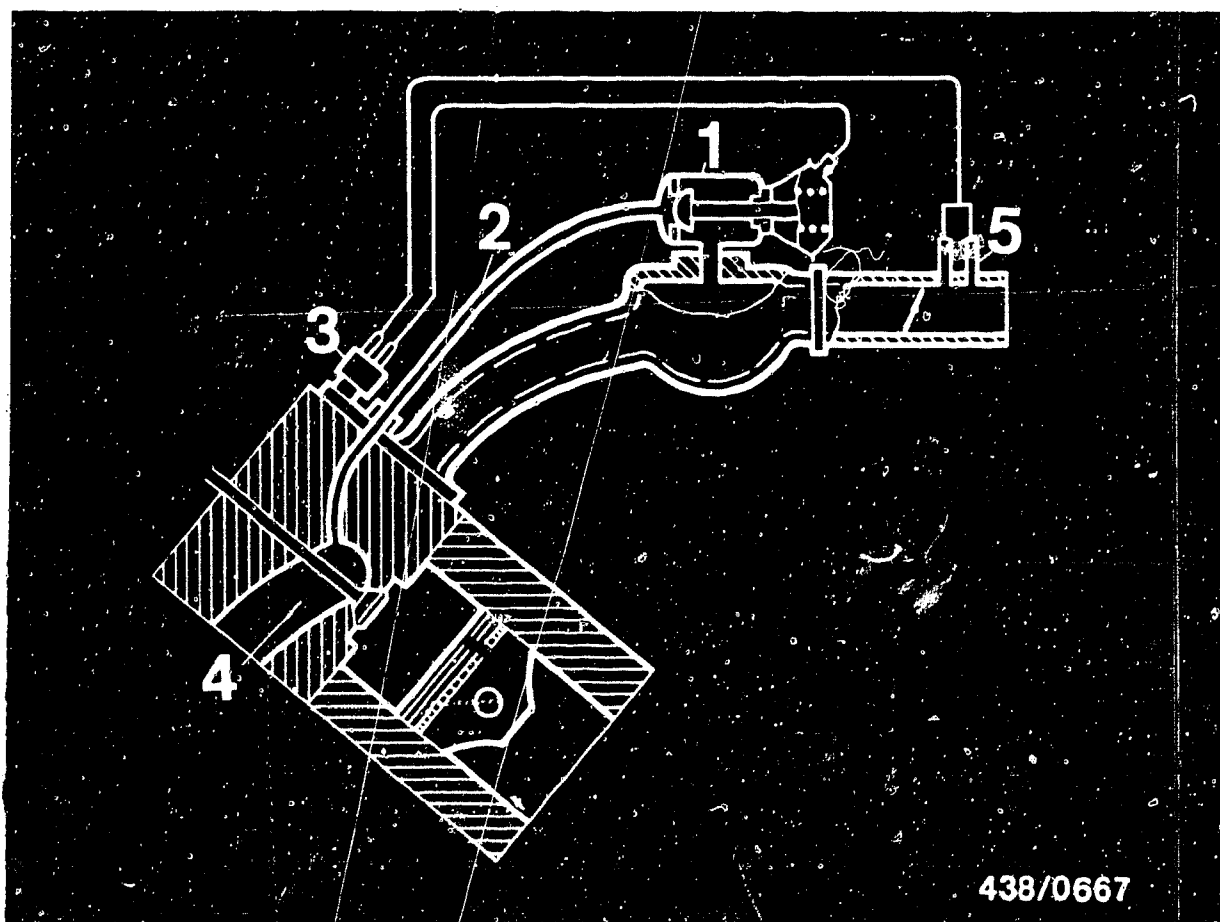
Vehicles of the Sweden version with manually-shifted transmission from model year 1980 are equipped with a time-delay valve for the vacuum advance of the ignition distributor (arrow).

The colour coding (surface on the side of the fitting facing the ignition distributor) is white (turbo version green) and the delay is approx. 6 seconds.

A15

General information
Saab 99/900





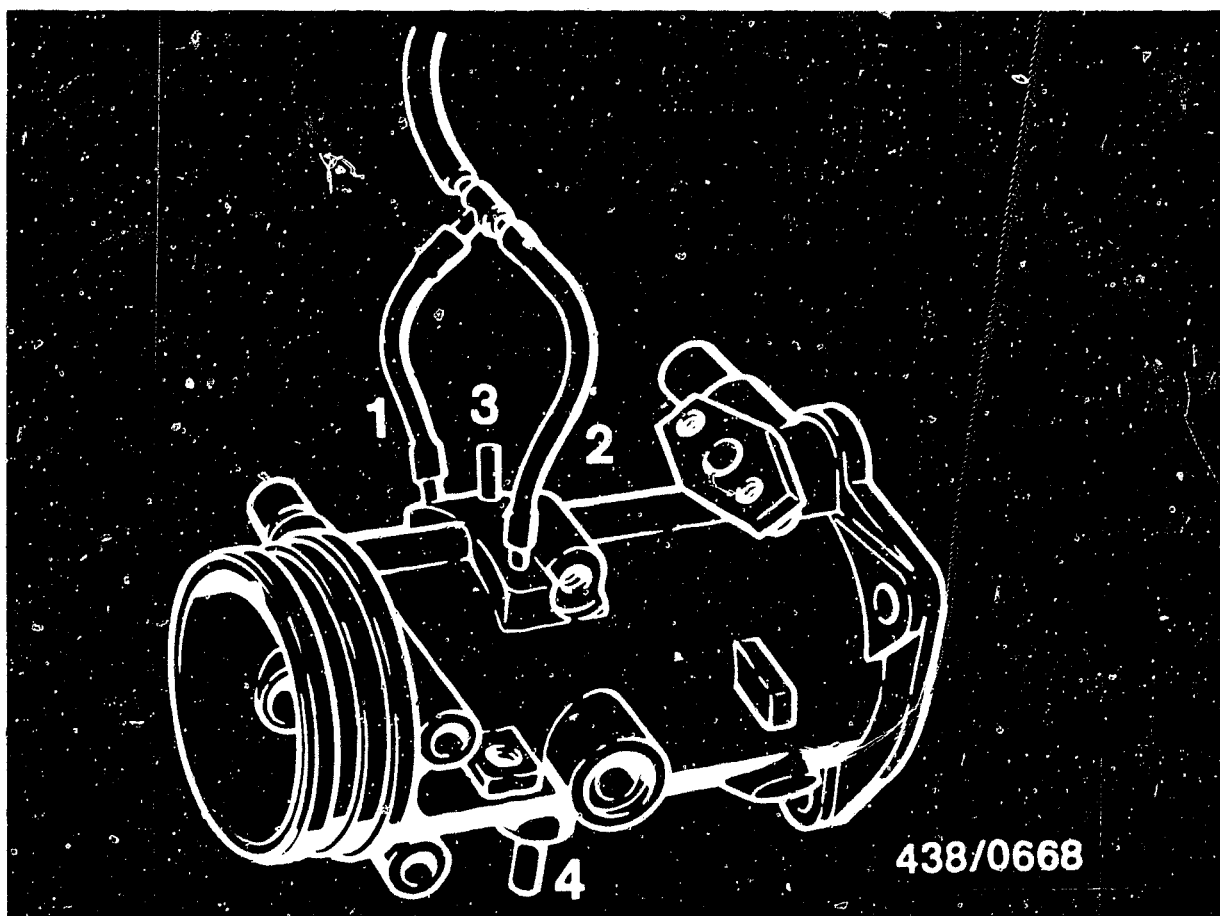
438/0667

- | | |
|-------------------------------------|---------------------------------|
| 1 = Exhaust-gas recirculation valve | 4 = Exhaust duct |
| 2 = Exhaust line | 5 = Intake-manifold connections |
| 3 = Thermostat valve | |

Vehicles of the Sweden version with automatic transmission are equipped with exhaust-gas recirculation. By recirculating a small proportion of the exhaust gases (taken from the exhaust duct of cylinder 2) to the intake manifold, the combustion temperature is lowered, thus reducing the emission of nitrogen oxides.

The system operates as a function of engine temperature and intake-manifold pressure. It is only in operation at engine temperatures above approx. 38°C and only at part load.





Vacuum connections on the throttle-valve housing:

- 1 = Connections for exhaust-gas recirculation
- 2 = Connections for exhaust-gas recirculation
- 3 = Connection for ignition distributor
- 4 = Sealed connection



5. Test equipment and tools

- Pressure tester KDJE-P 100 (previously KDEP 1034).
For testing all fuel pressures and testing for leaks.
- Adjusting wrench KDEP 1035.
For adjusting the idle-mixture-adjusting screw in the mixture-control unit (CO-adjustment).
- Guide ring KDEP 1040/10 (dia. 80 mm)
For centering the air-flow sensor plate in the air-flow sensor.
- Tester for delivered quantity comparison KDJE-P 200 (previously KDJE 7451).
For comparing the fuel delivered from the individual fuel-distributor outlets.
- Graduate (commercially available, capacity approx. 1.5 l)
For measuring the delivery of the electric fuel pump.
- Electric connecting cable (test lead).
KDJE 7450/70 for the direct connection of components to be tested, e.g. cold-start valve.



- Set of tools for the removal and fitting of idle-CO-anti-tamper device of air-flow sensor
(e.g. No. 131 090 from the firm Cartool, Hans Schubert KG, Unterer Grasweg 88, D-8070 Ingolstadt).
- Valve tester KDJE-P 400 (previously KDJE 7452).
For testing the injection valves.

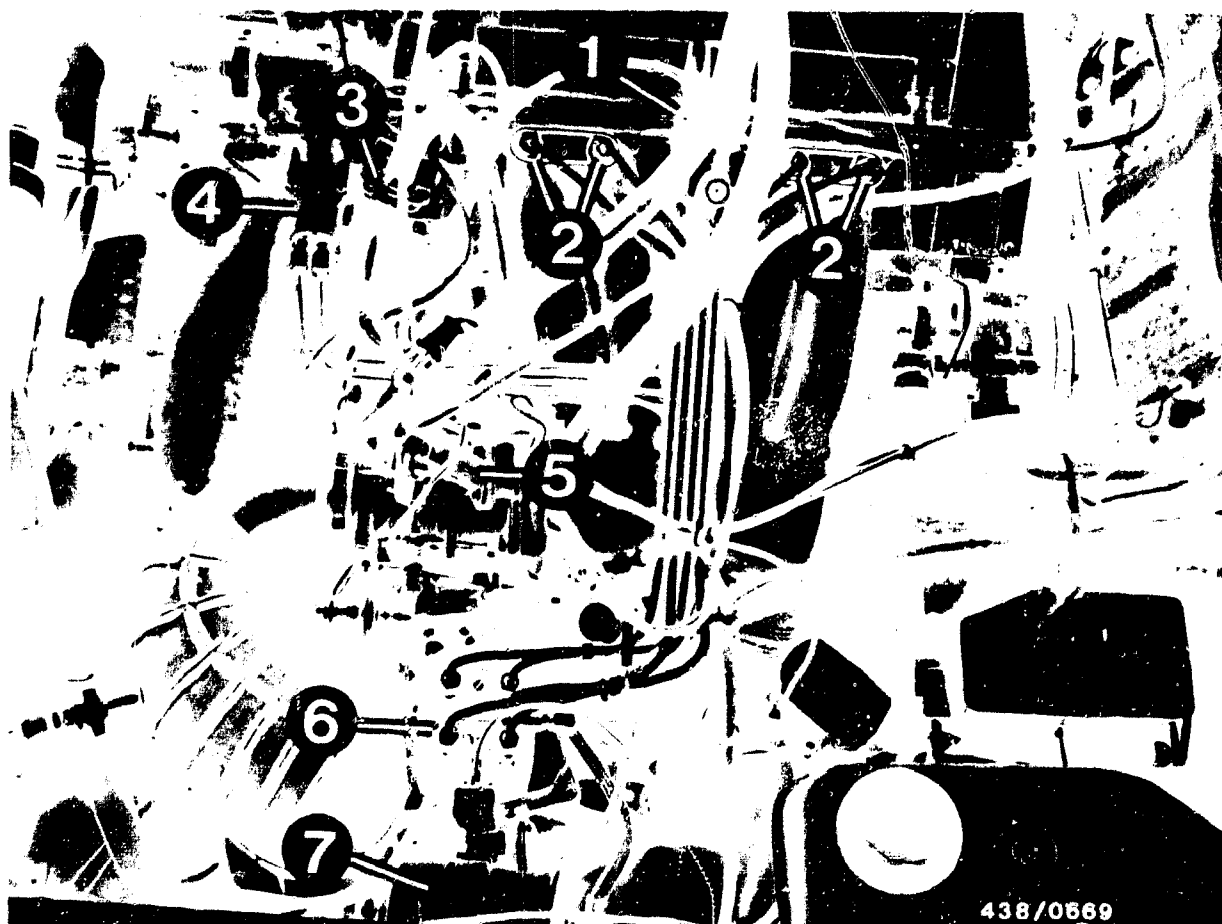
Test media: Calibrating fluid (Shell K 30, Esso-Varsol, Shell Mineral Spirits 135) or Bosch, Part Designation VS 14 942-CH previously Part No. 5 973 340 650
The Bosch calibrating fluid can be obtained in 5 l metal cans from the following supplier:
Firma
Oskar Gnam GmbH & Co
D-7531 Kämpfelbach-Bilfingen

Caution:

For safety reasons, never use normal gasoline or similar easily inflammable and combustible liquids. Even with calibrating fluid, be sure to observe the local official regulations.

- Tachometer (commercially available)
For idle-speed adjustment
- CO meter (commercially available)
For idle-speed CO adjustment.



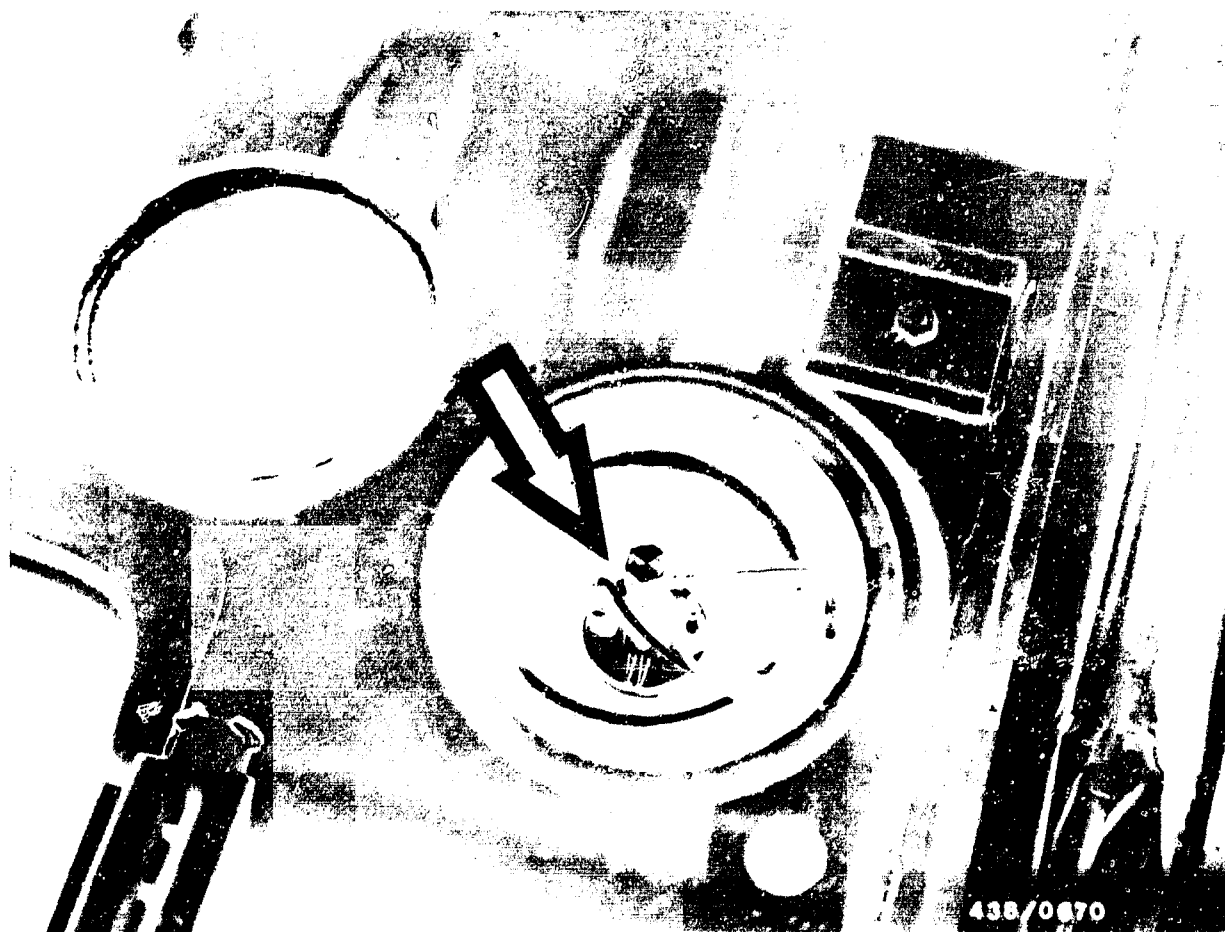


6. Installation position of individual components

Arrangement of components on the engine:

- 1 = Thermo-time switch
- 2 = Injection valves
- 3 = Auxiliary-air device
- 4 = Warm-up regulator
- 5 = Start valve
- 6 = Mixture-control unit
- 7 = Fuel filter



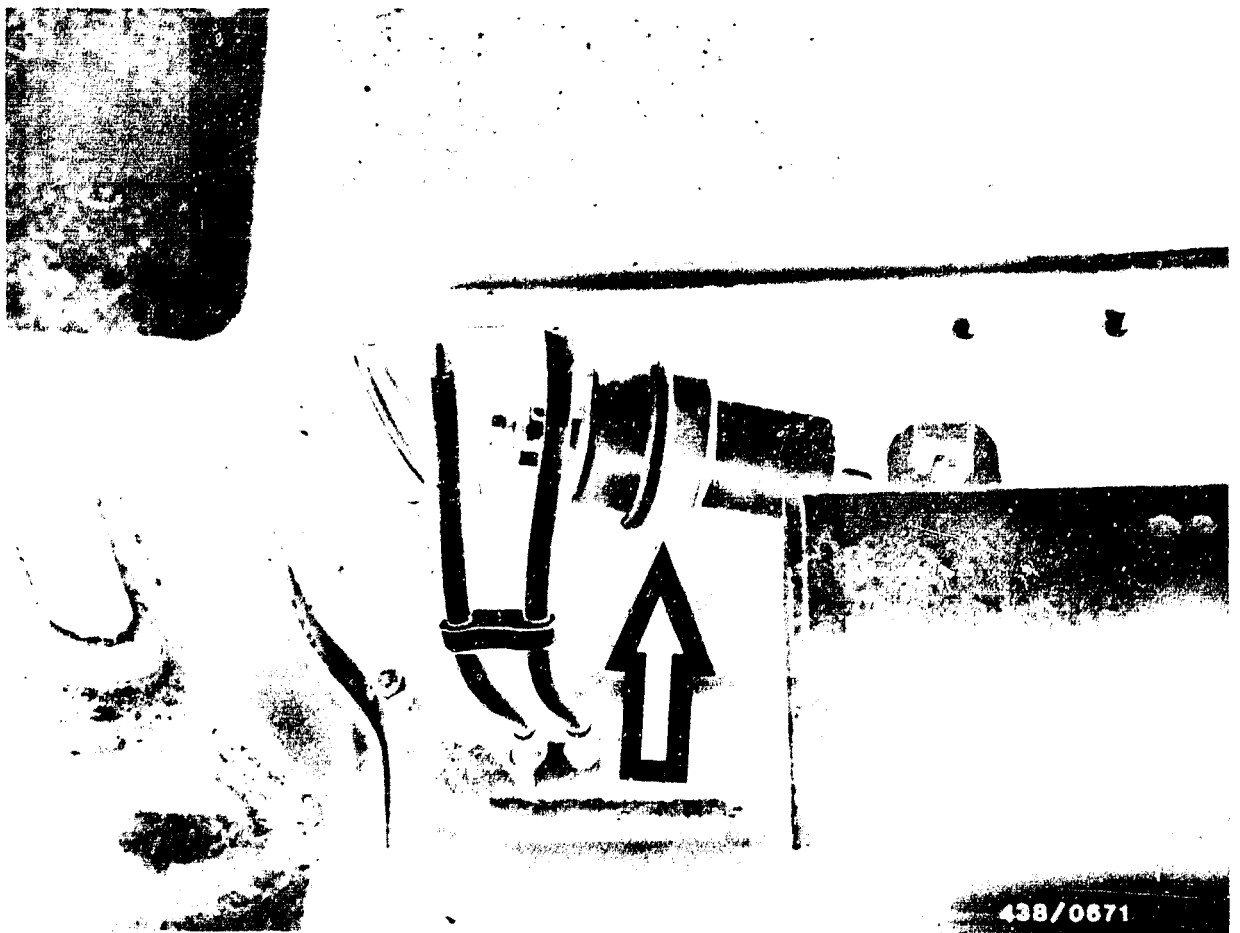


The electric fuel pump (arrow) is installed in the fuel tank. It is made accessible by removing the luggage-compartment floor board and the round cover plate in the floor assembly.

A21

Installation position of components
Saab 99/900





The fuel accumulator (arrow) is mounted on a mounting piece in front of the fuel tank, on the right-hand side as viewed from behind the vehicle.

A22

Installation position of components
Saab 99/900



7. Trouble-shooting chart

Customer complaint (fault symptom)

*Note:

If, in the case of Symptom 2, after checking and repairing all the fault causes listed below, the hot-start characteristic is still unsatisfactory this can be improved by fitting an impulse relay.

The fitting of this relay is described in Coordinates L 5.

							Cause	Coordinates
1.	2.	3.	4.	5.	6.	7.	Vacuum system leaking	B5
•	•		•	•	•	•	Air-flow sensor lever and/or control plunger not moving smoothly	B7
	•						Position of the air-flow sensor plate incorrect	B15
•		•					Auxiliary-air device does not open	B20
•	•				•		Electric fuel pump not operating	B22
•							Cold-start system defective	C8
		•	•				Cold-start valve leaking	C8
				•			Excessive fuel quantity for control-pressure circuit	C15
•		•					"Cold" control pressure outside tolerance	C13
	•		•	•	•	•	"Warm" control pressure too high (after warm-up)	C13
			•	•		•	"Warm" control pressure too low (after warm-up)	C13
					•	•	Primary (system) pressure outside tolerance	D4
	•						Overall fuel system leaking	D11
•	•	•	•		•		Injection valves leaking, opening pressure too low	E5
•	•	•	•			•	Unequal fuel delivery (imbalance of fuel delivery)	E15
•	•	•	•	•			Basic idle adjustment incorrect	F3
						•	Throttle plate does not open completely	--

B1

Trouble-shooting chart
Saab 99, 900



B2

Trouble-shooting chart
Saab 99, 900

Customer complaint (fault symptom) (continued)

8. Engine runs on after being switched off ("diesels")
9. Fuel consumption too high
10. Flat spot during acceleration
11. CO concentration during idling too high
12. CO concentration during idling too low
13. Idle-speed cannot be adjusted (too high)
14. Engine starts but then immediately stops

Cause							Coordinates
		●		●			Vacuum system leaking B5
●		●	●	●			Air-flow sensor lever and/or control plunger not moving smoothly B7
●							Position of the air-flow sensor plate incorrect B15
							Auxiliary-air device does not open B20
					●		Auxiliary-air device does not close B22
						●	Electric fuel pump not operating C8
							Cold-start system defective C8
●	●		●				Cold-start valve leaking C15
		●				●	Excessive fuel quantity for control-pressure circuit C13
		●				●	"Warm" control pressure too high (after warm-up) C13
	●	●	●			●	"Warm" control pressure too low (after warm-up) C13
		●				●	Primary (system) pressure outside tolerance D4
							Overall fuel system leaking D11
●							Injection valves leaking, opening pressure too low E5
		●					Unequal fuel delivery (imbalance of fuel delivery) E15
●	●	●	●	●			Basic idle adjustment incorrect F3
							Throttle plate does not open completely --

B 3

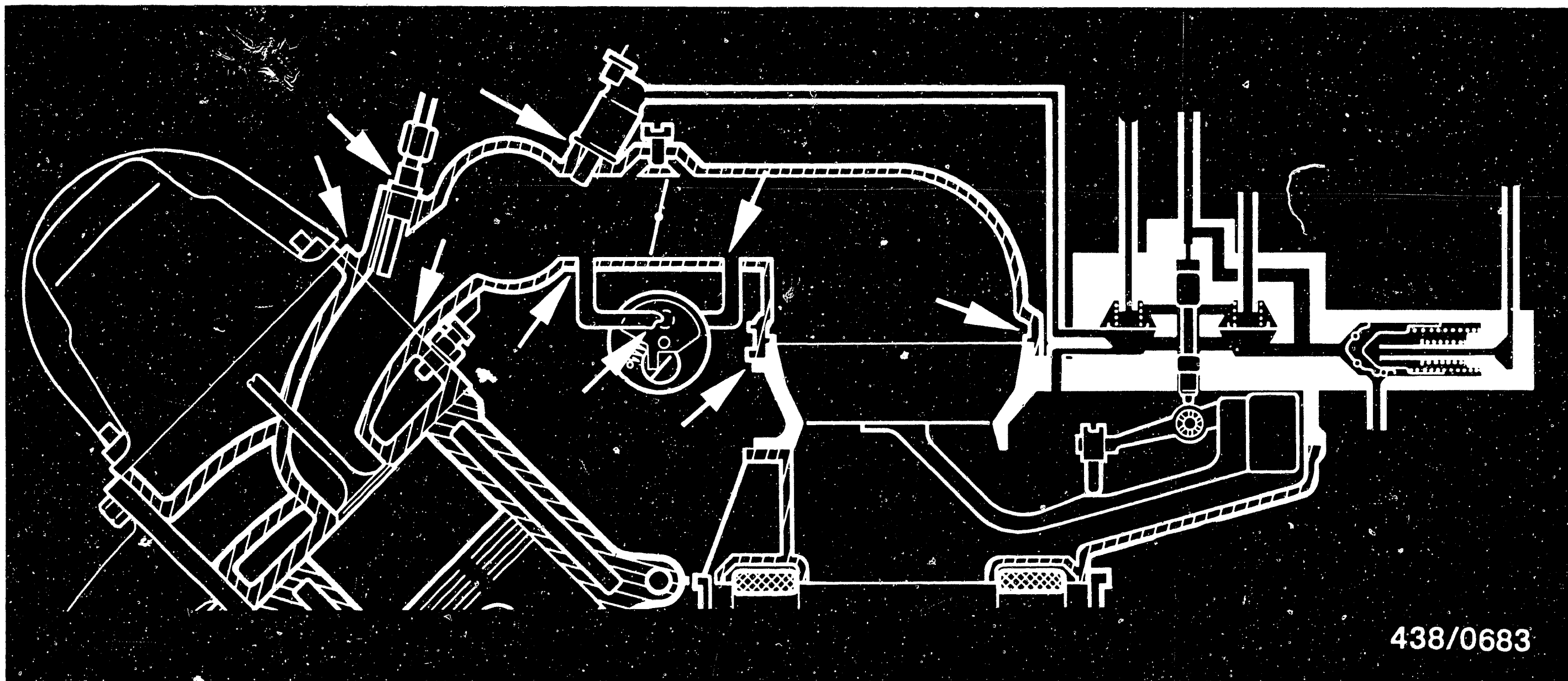
Trouble-shooting chart
Saab 99, 900



B 4

Trouble-shooting chart
Saab 99, 900





438/0683

Working steps

8. Check the vacuum system (air-intake system) of the engine for leaks.

The arrows in the diagram show typical points where leaks can occur. Check by performing a visual inspection or, in cases of doubt, as follows: Disconnect the hose from the outlet of the auxiliary-air device and blow air through this hose into the intake system using a compressed-air gun. The throttle valve is to be fully open. Brush connection points with soapy water, or spray with leak detector (e.g. Gúpoflex).

Under no circumstances may combustible liquids be used when testing for leaks.

The formation of bubbles or foam indicates a leak. If a leak has been eliminated, it is necessary finally to adjust the idle speed with the engine at normal operating temperature: Idle-speed adjustment is described on Coordinates F 3.

B5

Leak test on air-intake system

Saab 99, 900



B6

Leak test on air-intake system

Saab 99, 900



9. Check the control lever in the air-flow sensor and the control plunger in the fuel distributor for ease of movement.

9.1 Preparations

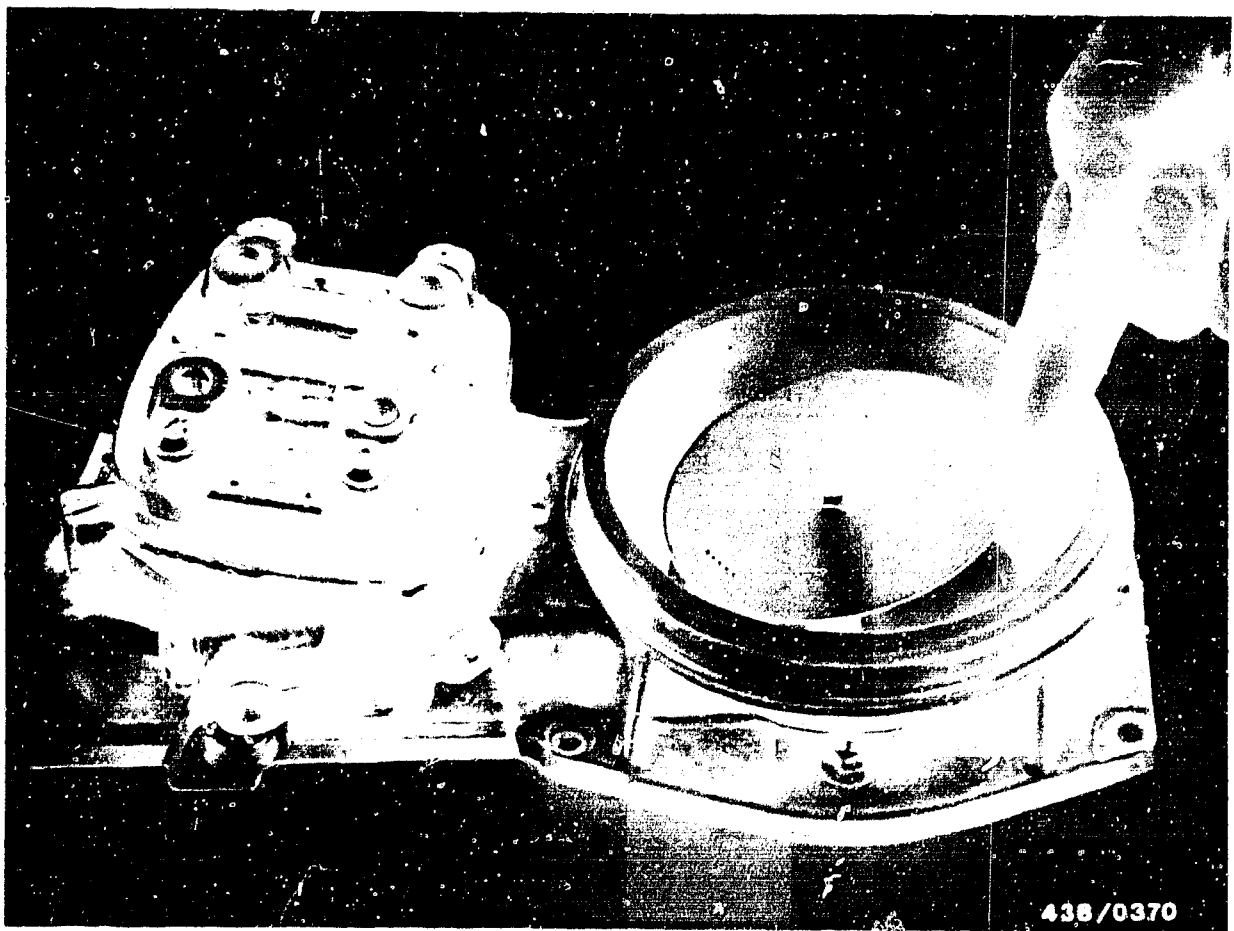
- Engine temperature not below +20°C.
- Remove the rubber hood so that the air-flow sensor plate becomes accessible.
- Switch on the electric fuel pump for approx. 10 seconds by bridging the safety circuit.
This results in application of the control pressure to the control plunger in the fuel distributor.

B7

Air-flow sensor/fuel distributor

Saab 99, 900





9.2 Check that the control lever moves freely

Raise the air-flow sensor plate by hand (updraft) and release again.

The sensor plate snaps back into the zero position and bounces up about twice from the spring-loaded stop.

If the control lever does not move freely, first release all fastening screws holding the air-flow sensor to determine whether housing deformation is the cause of the problem.

If the problem is solved by loosening the fastening screws, the seal between the air-supply housing and air-flow sensor should be changed (Saab parts).

Tighten the screws uniformly cross-wise.

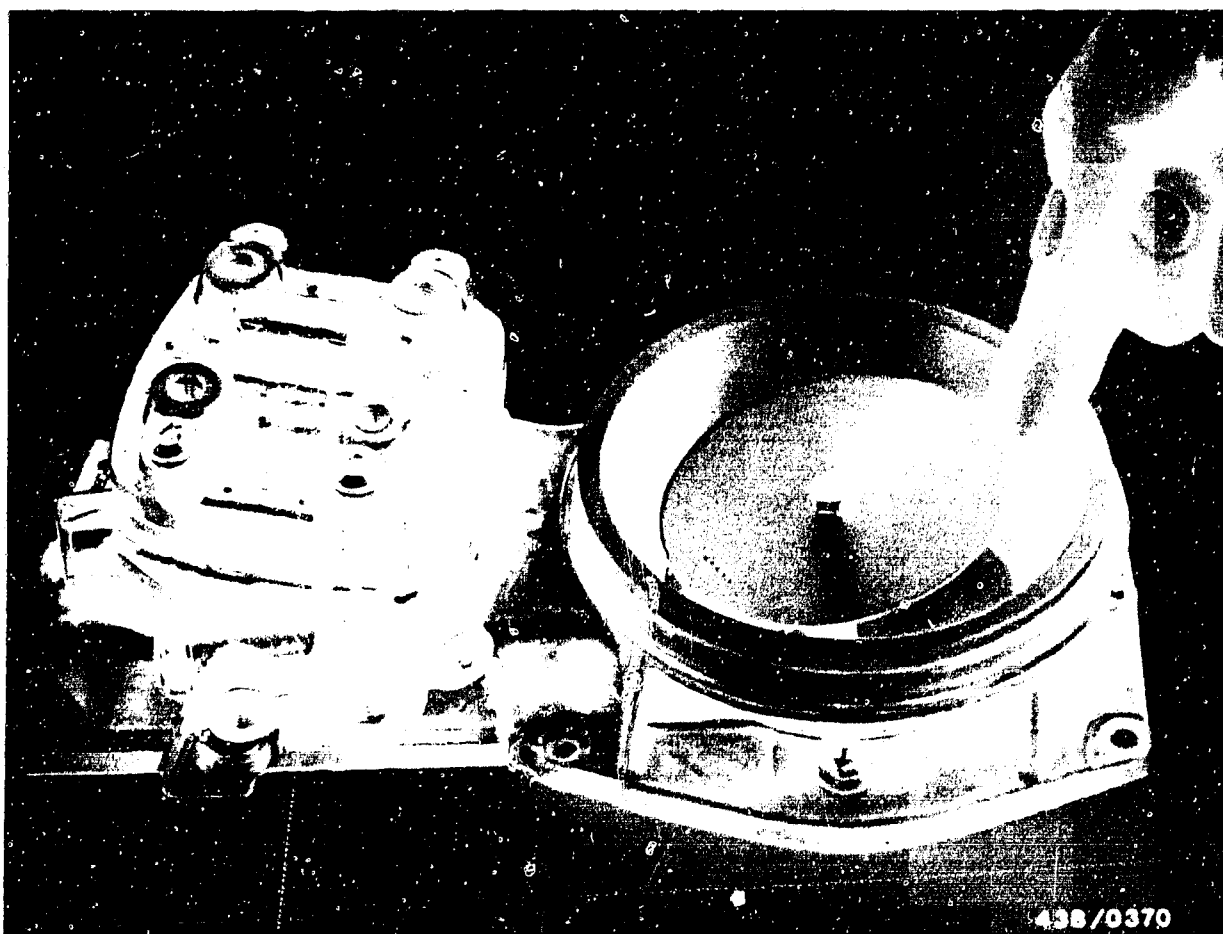
If the housing is not deformed, then the air-flow sensor must be repaired or replaced.

B8

Air-flow sensor/fuel distributor

Saab 99, 900





9.3 Check that the control plunger moves freely.

Raise the air-flow sensor plate by hand (updraft). The same resistance must be felt over the entire movement. Move the sensor plate rapidly back to a position just in front of the zero stop. The control plunger follows only sluggishly, but must make noticeable contact with the sensor plate lever. If this condition is fulfilled, the control plunger can be considered to move freely. If the control plunger does not move freely, remove the fuel distributor from the air-flow sensor.



Important!

Note the following when installing fuel components and fuel lines:

Always ensure utmost cleanliness when loosening or tightening the fuel connections. No dirt must enter the fuel system.

When loosening or tightening the fuel connections, apply counter-force at the fixed hexagon of the component.
Clean the fuel distributor thoroughly in the region of the fuel connections.
Screw off all connections.

B 10

Air-flow sensor/fuel distributor

Saab 99, 900





438/0028

Unscrew the three fastening screws and remove the fuel distributor from the air-flow sensor.

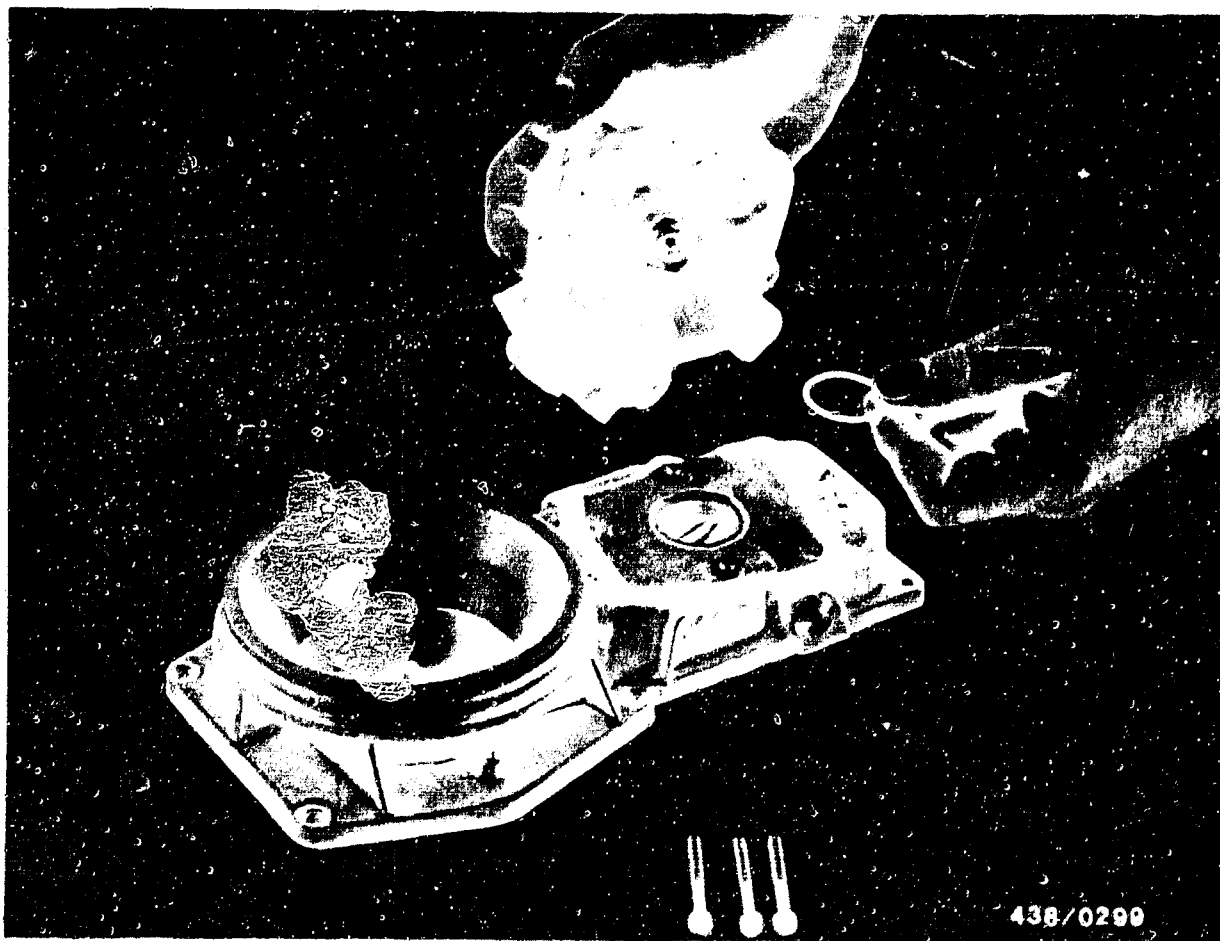
Remove the plunger. Under certain conditions, in order to do this it may be necessary to blow compressed air briefly against the plunger through the control-pressure connection hole. Hold the plunger with your hand while doing this. Clean the plunger thoroughly with benzine. If the plunger still does not move freely, replace the fuel distributor.

B11

Air-flow sensor/fuel distributor

Saab 99, 900



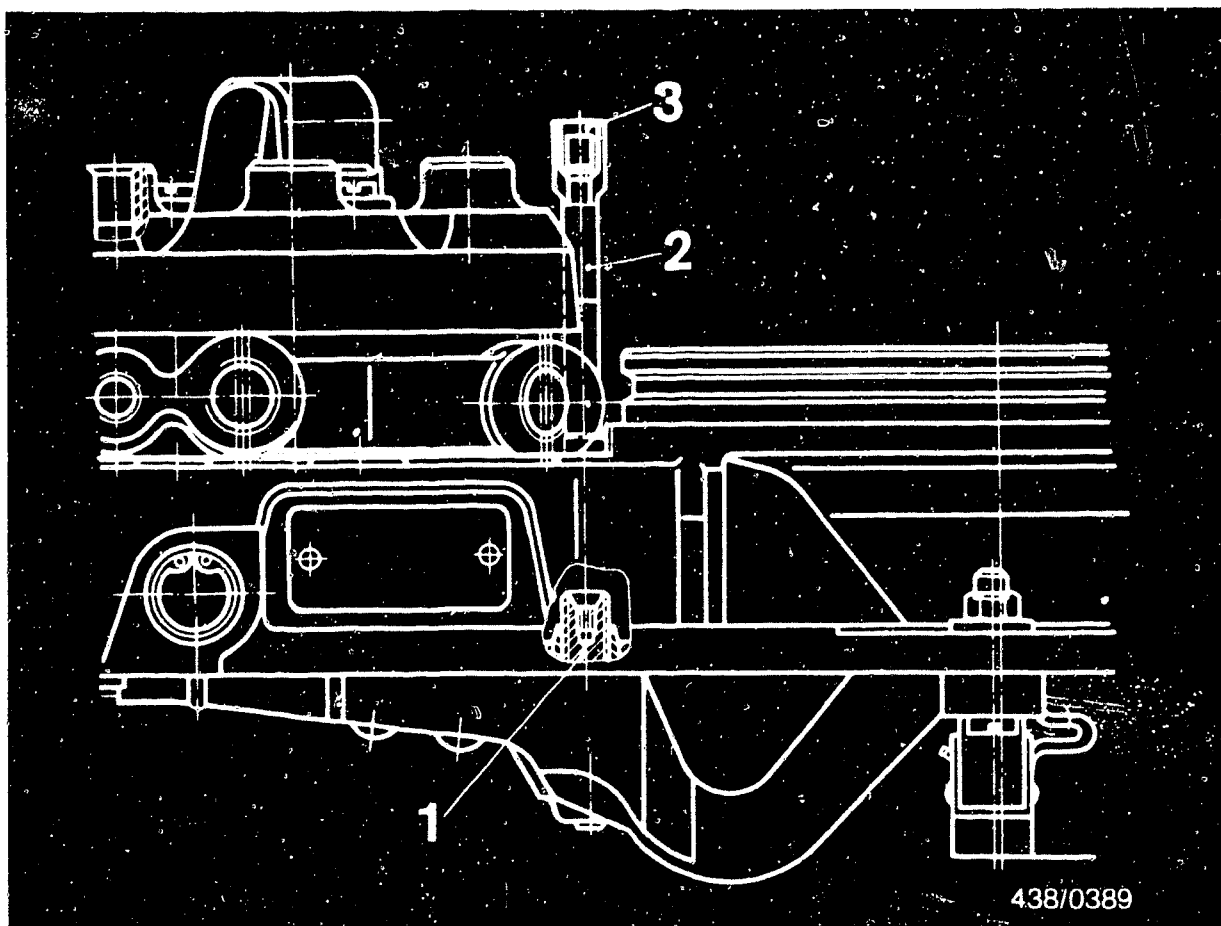


9.4 Fitting the fuel distributor

When fitting the fuel distributor, use a new seal ring between fuel distributor and air-flow sensor. Observe the tightening torque 3.2...3.8 Nm (0.32...0.38 kgfm) for the fastening screws precisely.

When connecting the fuel-injection tubing, use new seal rings.

The connecting screws of the fuel-injection tubing on the fuel distributor should be tightened to a torque of 10...12 Nm (1...1.2 kgfm).



- 1 = Idle-mixture-adjusting screw
- 2 = Guide tube
- 3 = Lead seal

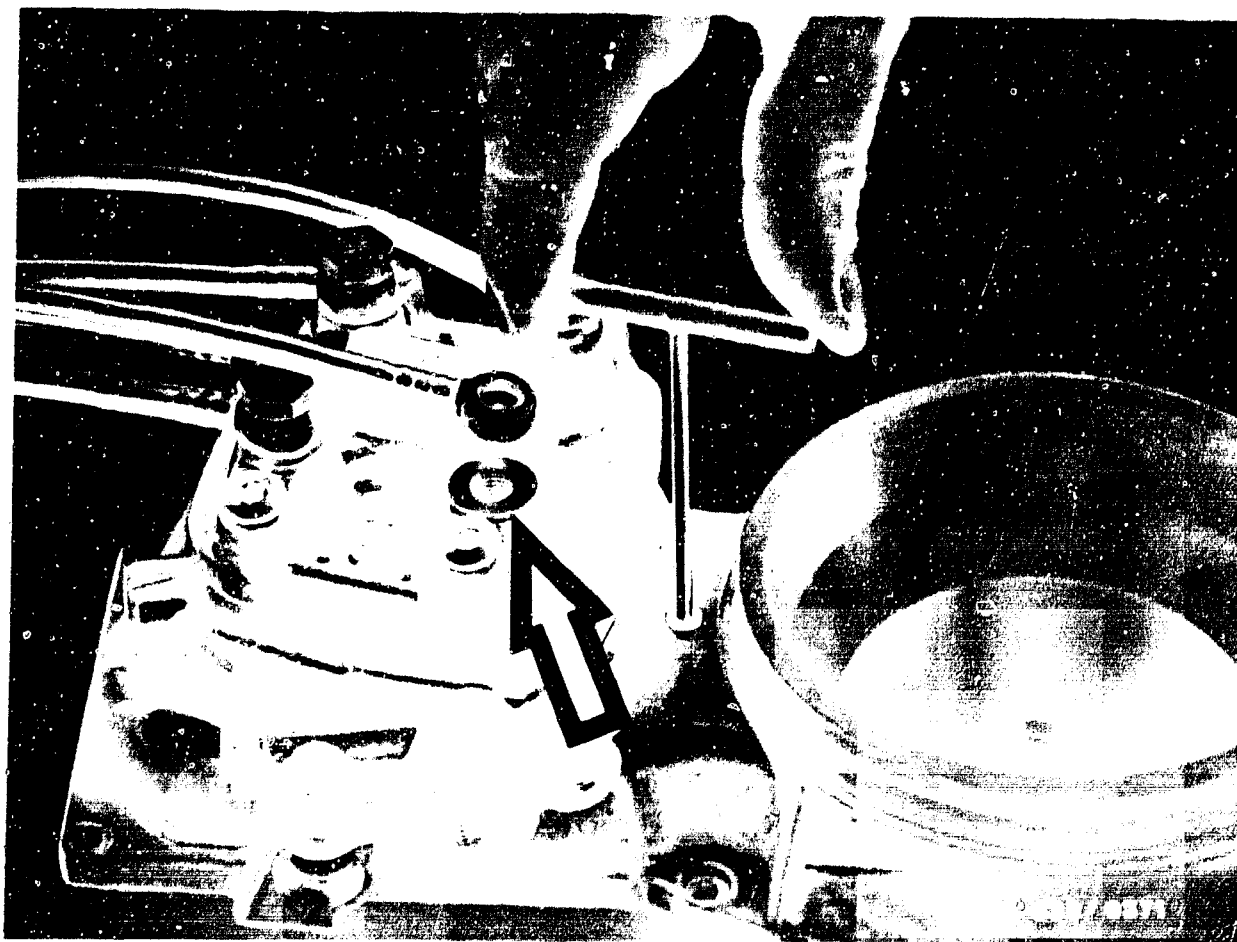
9.5 Matching the fuel distributor to the air-flow sensor for initial starting

Screw off one fuel-injection line from the fuel distributor.

Bridge the electrical safety circuit so that the electric fuel pump operates.

The idle-mixture-adjusting screw is adjusted via a guide tube rigidly fitted on the mixture-control unit.

Remove anti-tamper device (lead seal) of the idle-mixture-adjusting screw. Introduce adjusting wrench KDEP 1035 through the hole into the idle-mixture-adjusting screw.



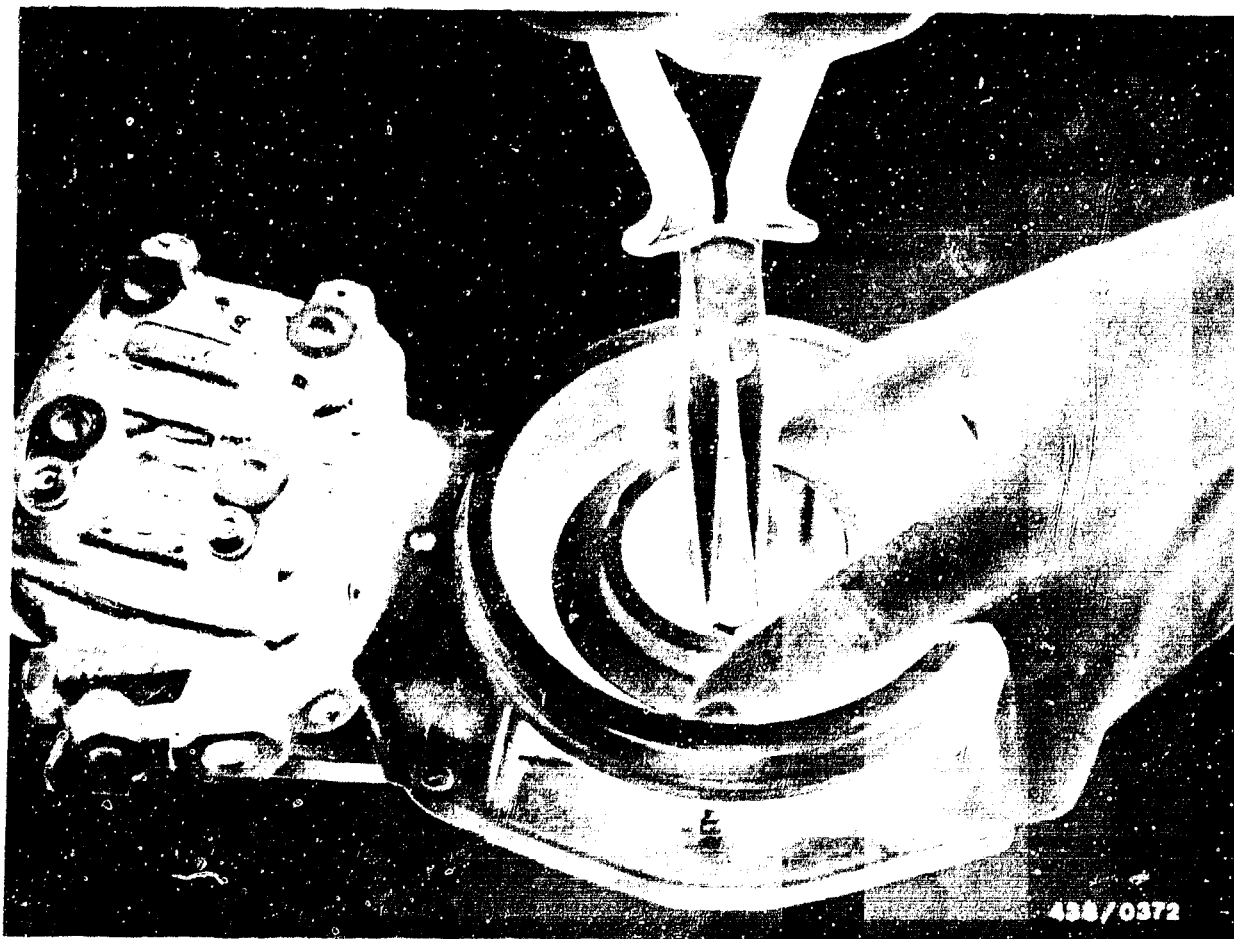
Screw in the idle-mixture-adjusting screw slowly and without exerting any great pressure on the adjusting wrench until fuel is just delivered from the open outlet (arrow) of the fuel distributor. Then turn back the adjusting screw by 1/2 turn.

Re-connect the fuel-injection line to the fuel distributor, start the engine and warm up.

The final matching of air-flow sensor and fuel-distributor is carried out by adjusting the idle speed with the engine at normal operating temperature.

Idle-speed adjustment is described on Coordinates F 3.





10. Checking and adjusting the position of the air-flow sensor plate

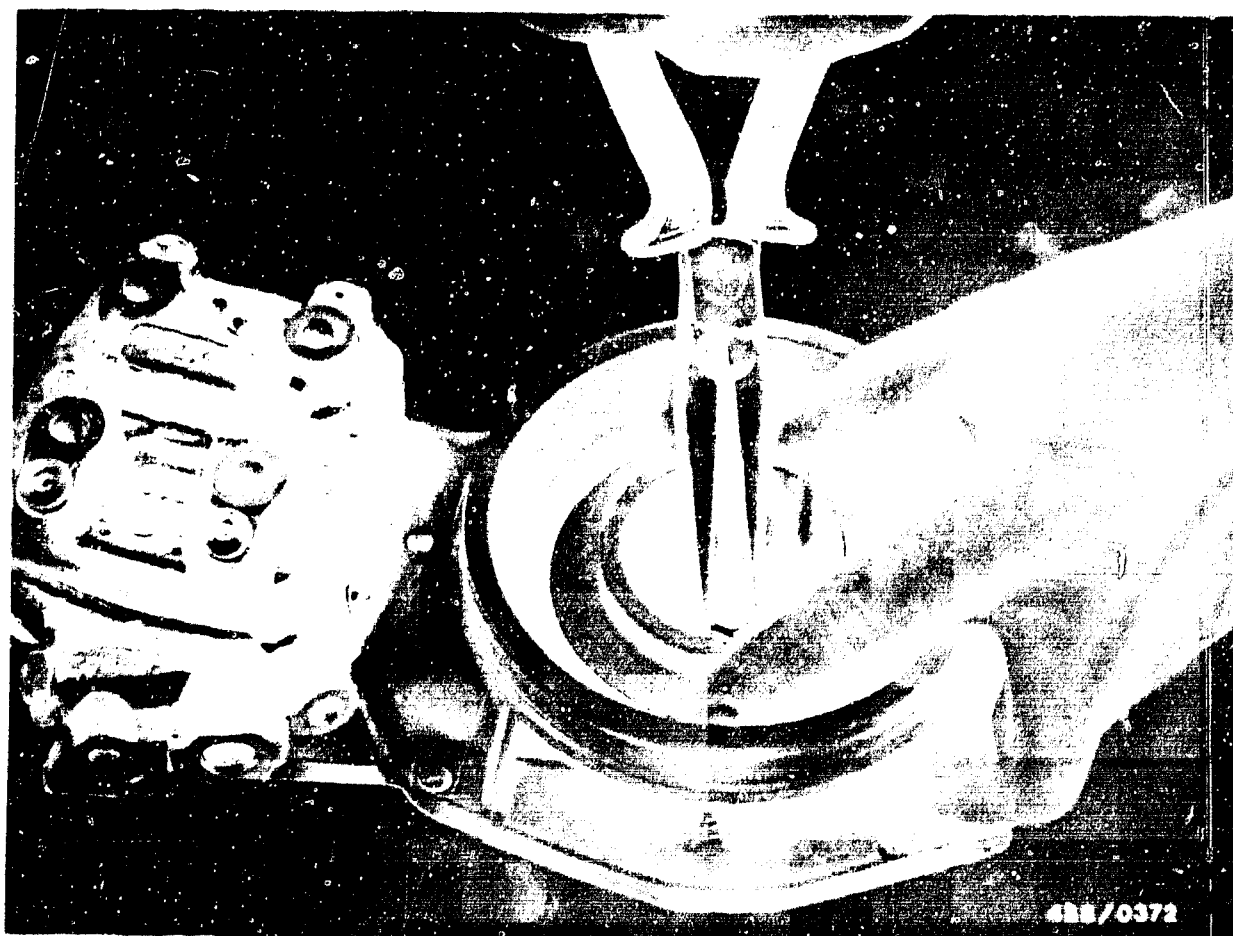
10.1 Preparations

- Engine temperature is not important.
- Remove the rubber hood from the air-flow sensor (release 2 clamping bands), so that the air-flow sensor plate becomes accessible.

B 15

Checking/adjusting air-flow sensor plate
Saab 99, 900





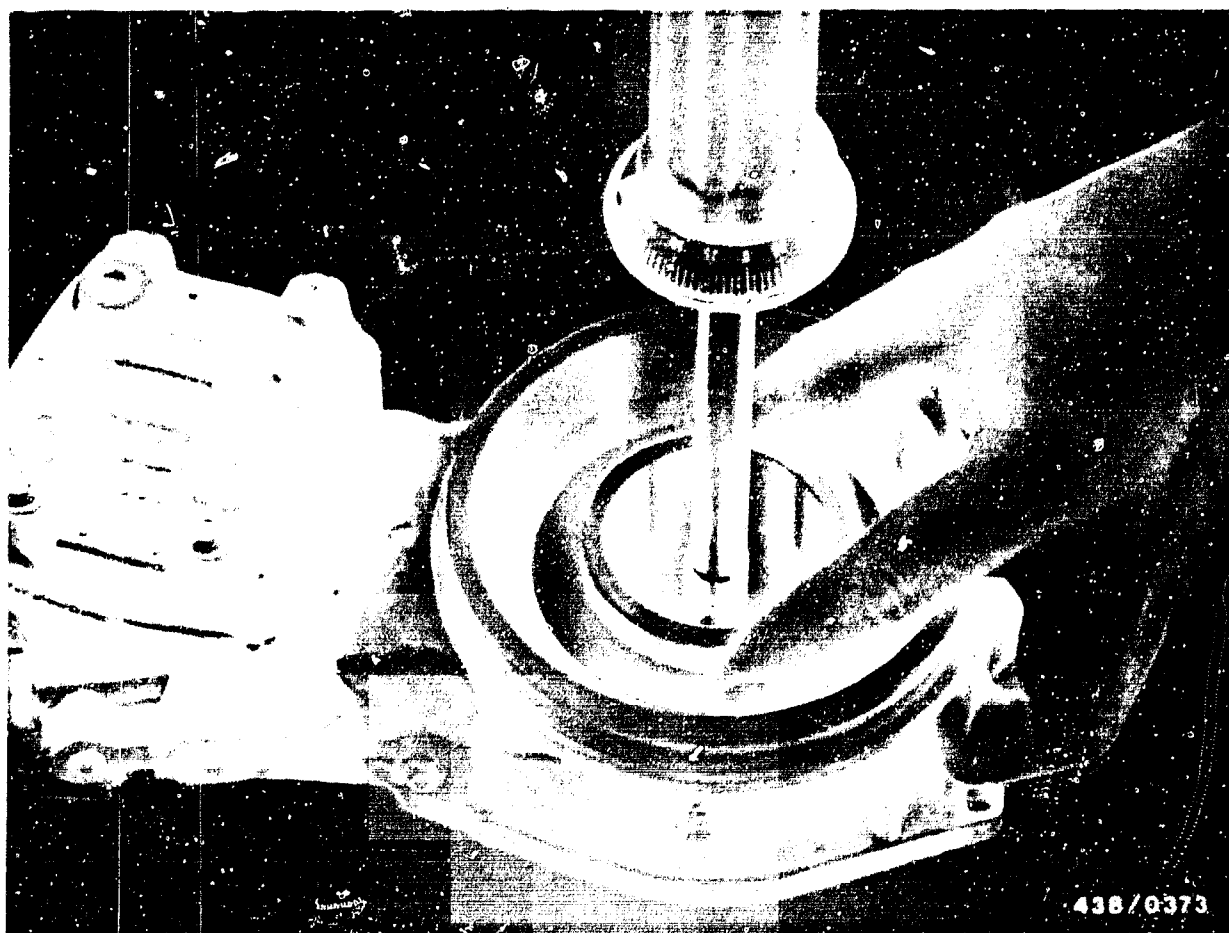
10.2 Centering the air-flow sensor plate

Check that the sensor plate is flat (not bent) and that it can move through the narrowest part of the air funnel without touching the funnel.

If necessary, center it using a positioning ring KDEP 1040/10 (dia. 80 mm) as follows:

Loosen the sensor plate fastening screw. Insert the positioning ring while holding the fastening screws with pliers so that the sensor plate does not deflect downwards.





With the positioning ring in place, tighten the fastening screw with a torque of 5.0...5.5 Nm, loosen again and tighten again with the same torque.

When tightening the screw make sure that the air-flow sensor plate is in its zero position (in the cylindrical part of the air funnel).

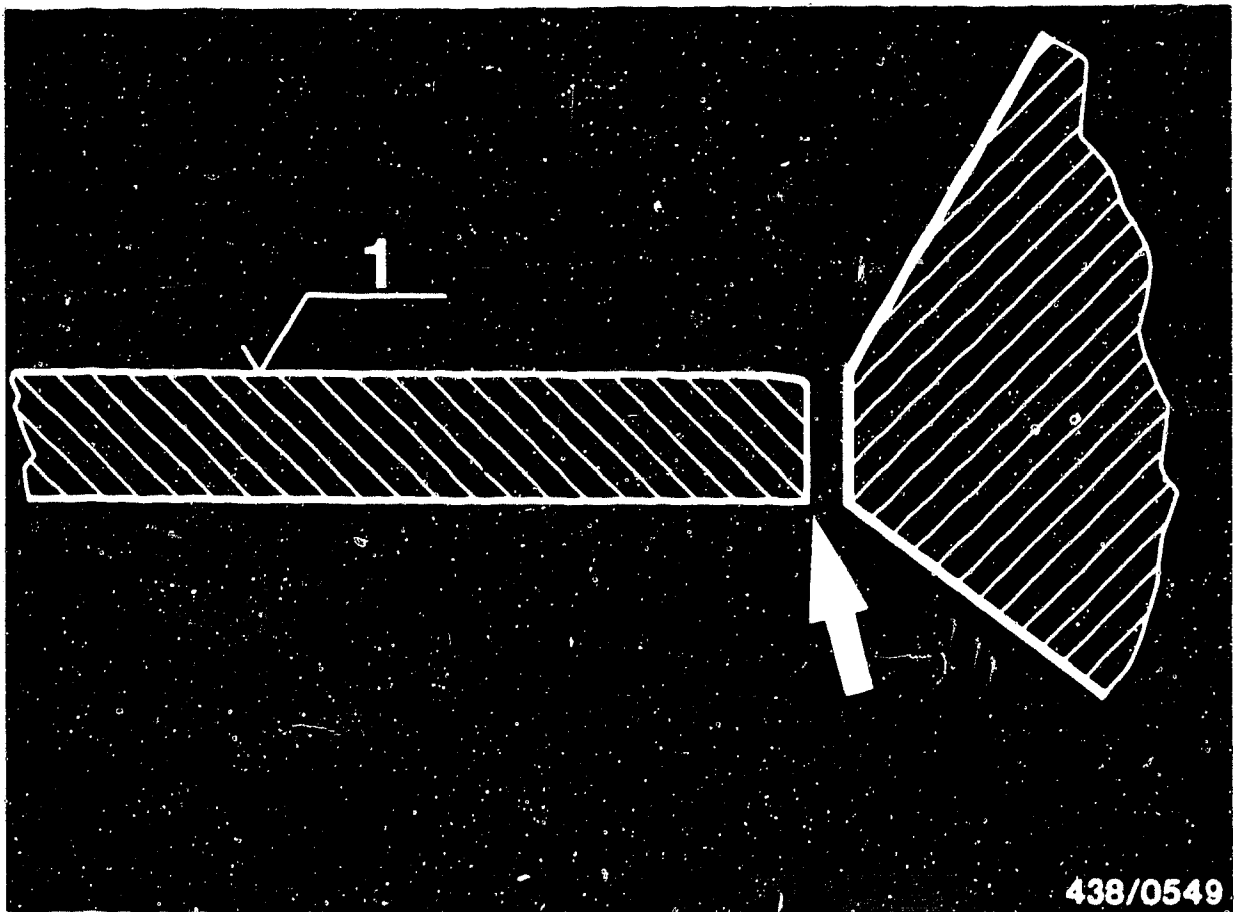
It must no longer be possible to turn the air-flow sensor plate by hand.

B17

Checking/adjusting air-flow sensor plate

Saab 99, 900





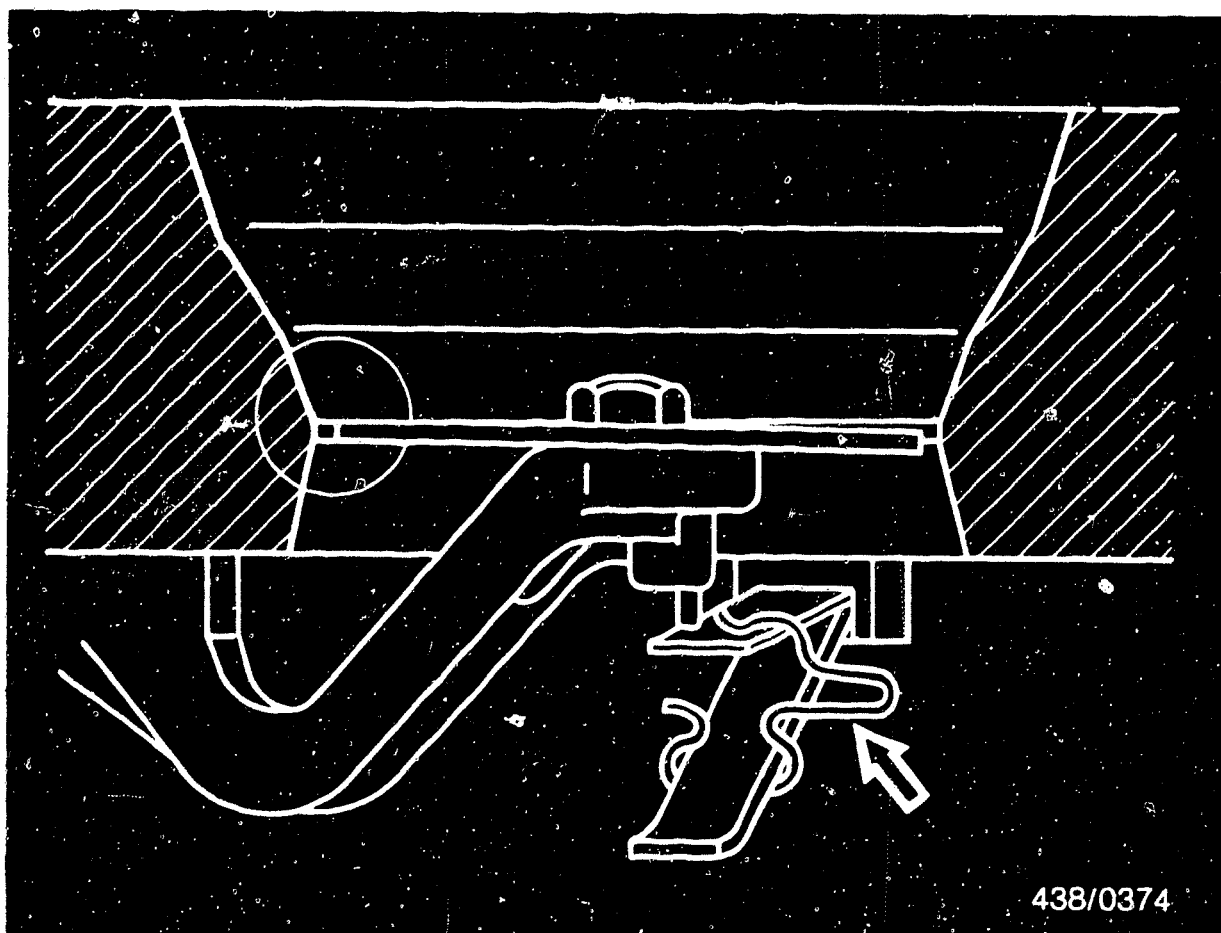
1 = 5 punch marks

Caution:

Be sure that sensor plate is mounted in correct position!
Its upper side is identified by five punch marks (in a row).

The sharp edge (arrow) is at the bottom.





10.3 Checking and adjusting the zero position of the sensor plate (rest position):

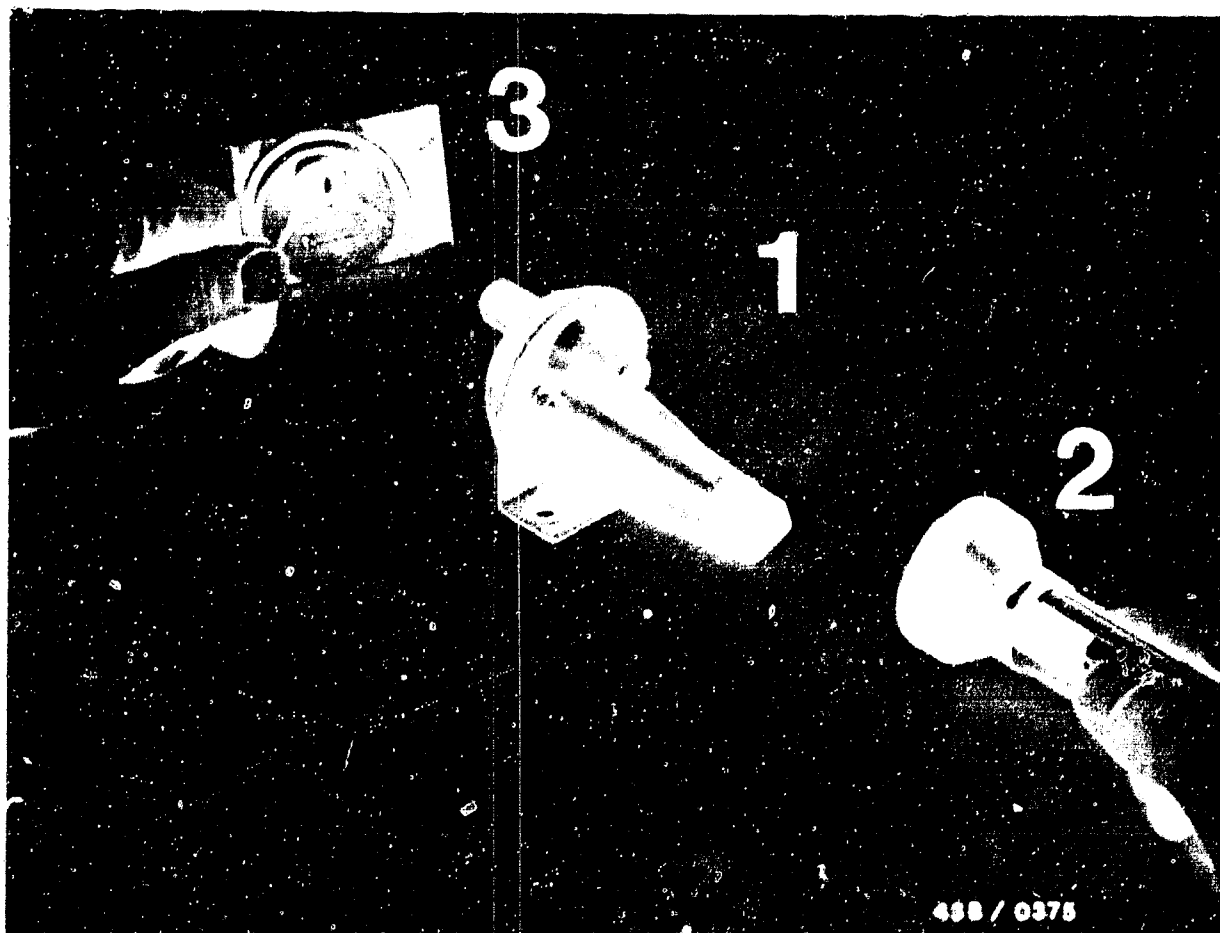
Switch on the electric fuel pump for approx. 10 seconds by bridging the safety circuit.

This results in application of the control pressure to the control plunger in the fuel distributor.

The upper edge of the sensor plate must be flush with the beginning of the cone in the position shown in the picture. A lower position of up to maximum 0.5 mm is permissible, however the air-flow sensor plate must not project at any point on its circumference outside the cylindrical part of the air funnel.

If necessary, the position of the leaf-spring limit-stop can be corrected by adjusting the shaped spring (arrow).





- 1 = Auxiliary-air device
- 2 = Flashlight
- 3 = Mirror

11. Checking the operation of the auxiliary-air device.

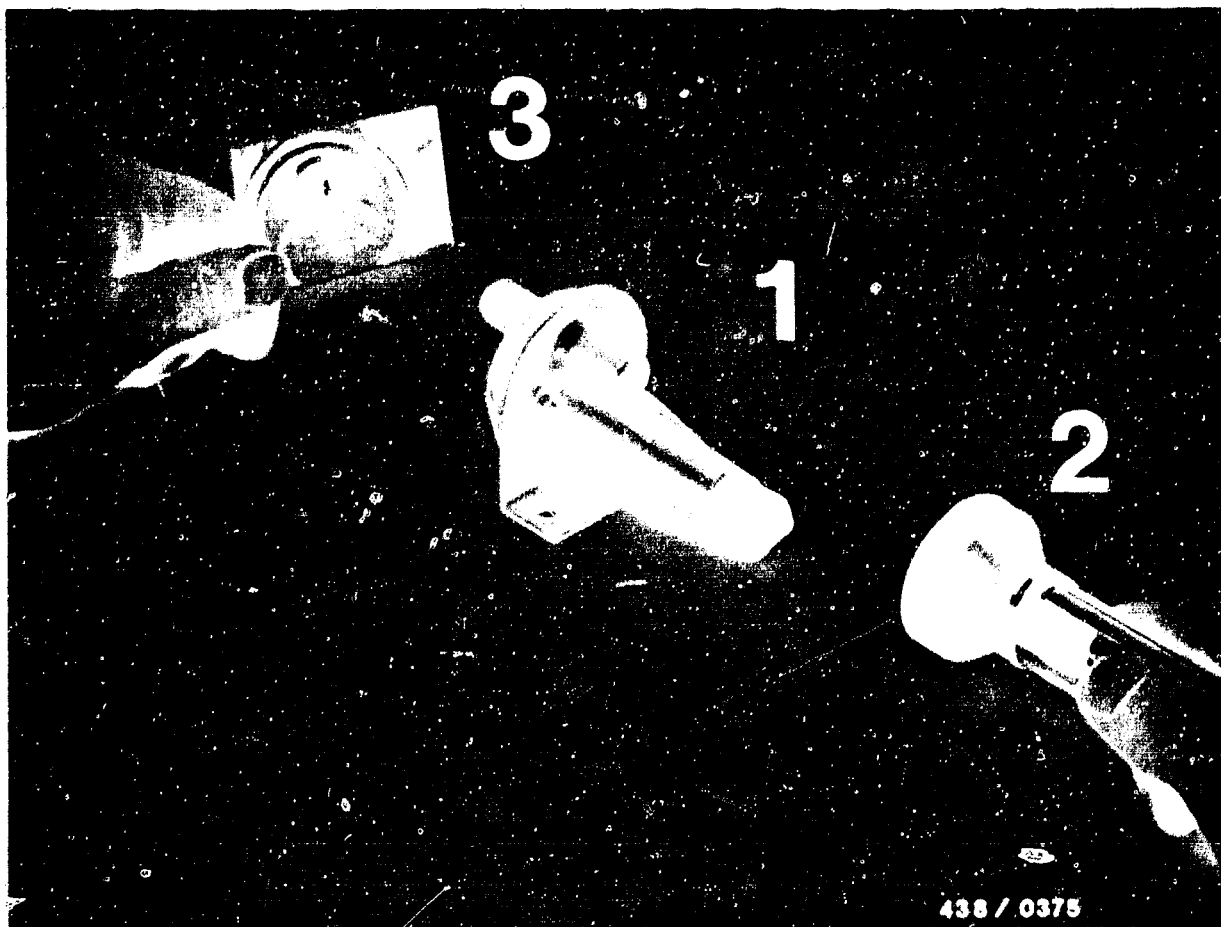
The engine must be cold.

Disconnect the electric cable plugs from the auxiliary-air device and warm-up regulator.

Disconnect both air hoses from the auxiliary-air device.

Since the two hose fittings on the auxiliary-air device are located exactly opposite each other, a visual check can now be made to see if the blocking plate is partially open.





It will be easier to look through the auxiliary-air device with the aid of a flashlight and a mirror, as shown in the illustration.

If an opening is not visible with the engine cold, replace the auxiliary-air device.

Fit the electric cable plug on the auxiliary-air device. By bridging the electrical safety circuit, supply power to the auxiliary-air device.

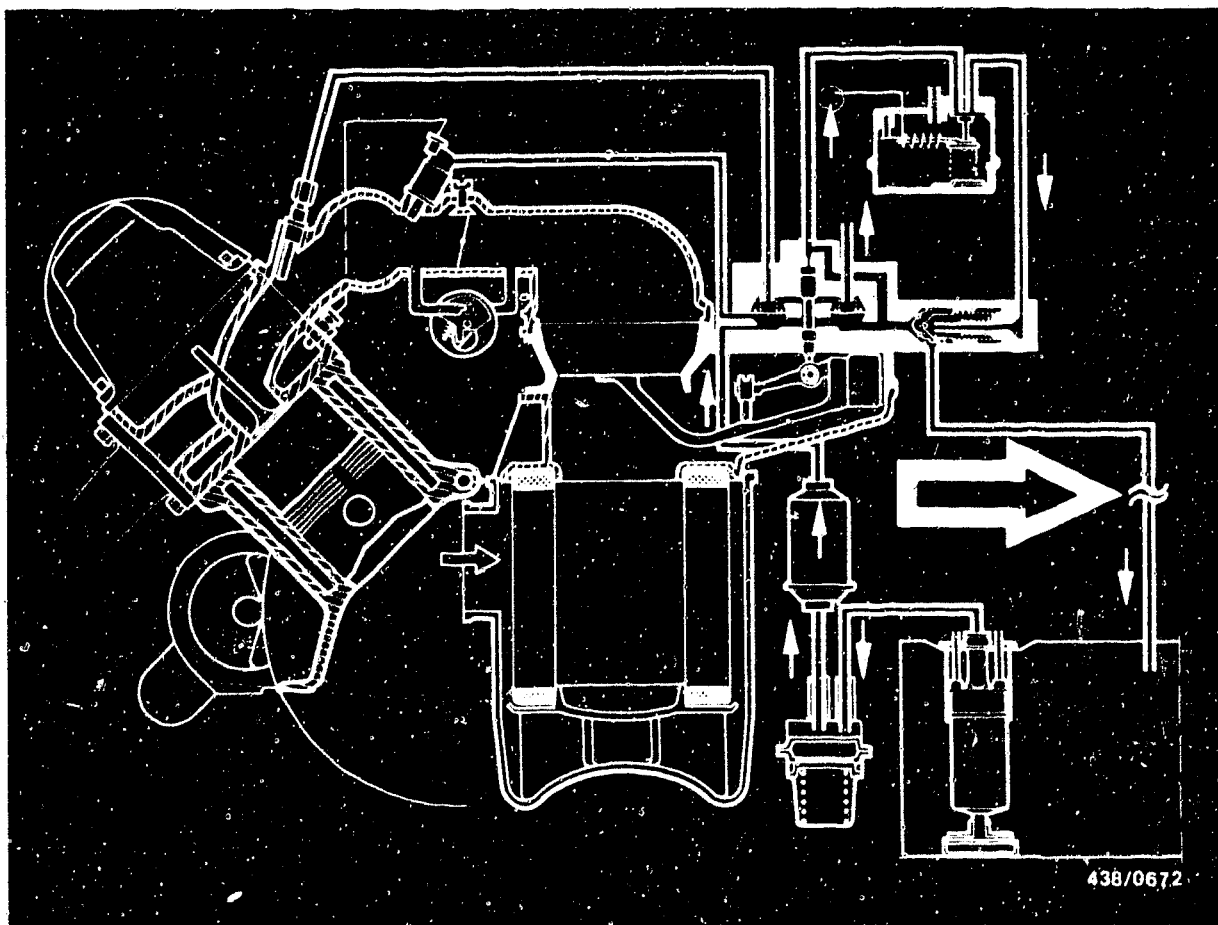
After a maximum of 10 minutes, the opening in the auxiliary-air device must be completely closed by the blocking plate.

If the blocking plate does not close, check the power supply (open circuit, voltage drop).

The minimum voltage at the connector is 11.5 V with the engine switched off. If these points are O.K., check the heating coil in the auxiliary-air device with an ohmmeter for an open circuit.

Replace a defective auxiliary-air device.



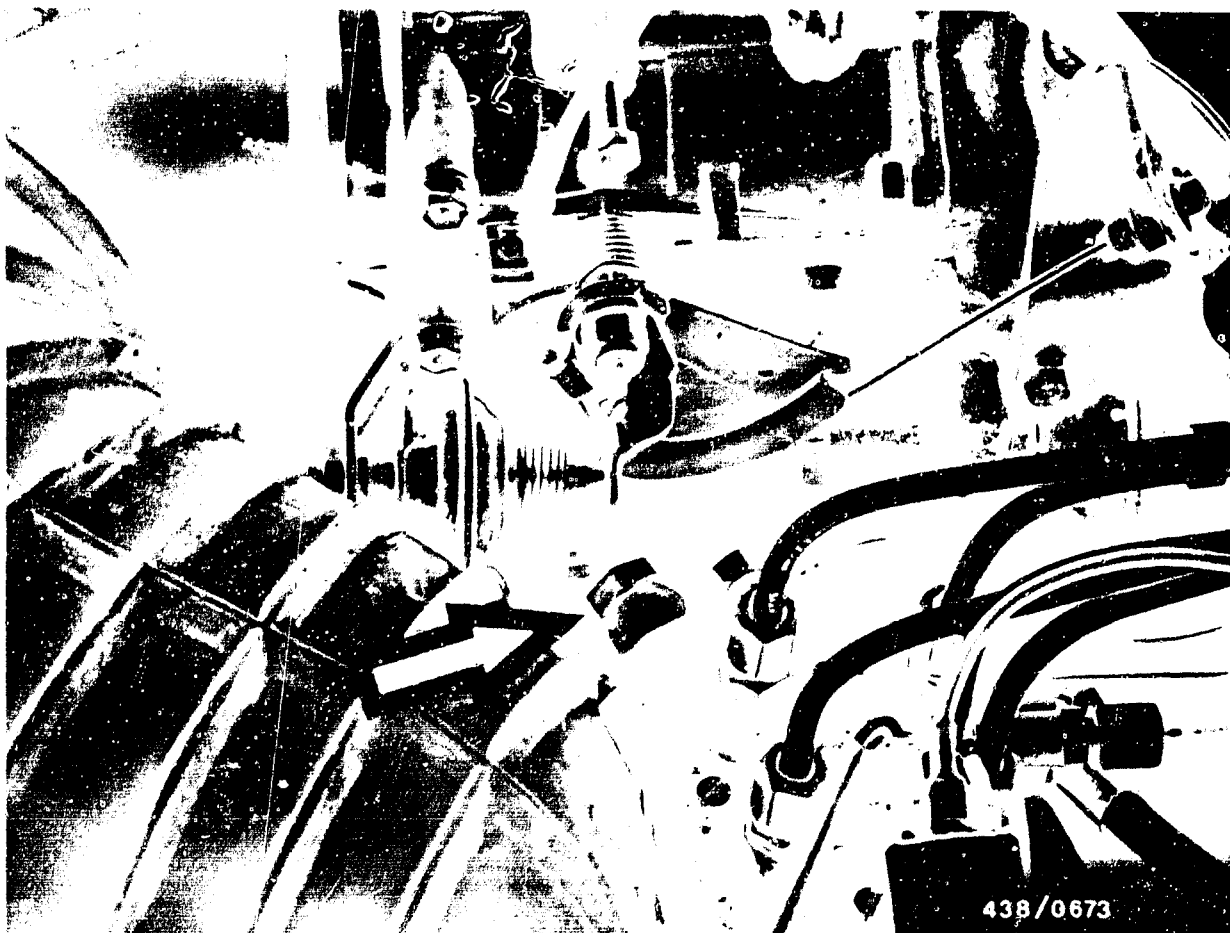


12. Checking the operation of the electric fuel pump.

12.1 Requirement

Conclusive information on the operation of the electric fuel pump can only be given by a measurement of fuel delivery under pressure, i.e. under primary (system) pressure. This measurement must therefore be made at the return line leading to the fuel tank (arrow).





12.2 Measuring point:

A suitable measuring point for fuel-delivery testing is the return port (arrow) on the fuel distributor. Unscrew the fuel return line. Equip a test hose with an inlet union (dia. 12 mm) and connect to the return port of the fuel distributor.

Hold the end of the hose in a graduate (approx. 1.5 litre capacity) in order to make the measurement.

C1

Checking electric fuel pump
Saab 99, 900



12.3 Checking:

Pull off the plug from the warm-up regulator and auxiliary-air device. Switch on the electric fuel pump for 30 seconds by bridging the safety circuit and collect the fuel delivered in a graduate.

12.4 Test specification:

Fuel delivery: at least 750 cm³/30 seconds.

12.5 Possible causes of insufficient fuel delivery:

- Power supply to the electric fuel pump defective, voltage drop. Minimum voltage at terminal with pump operating = 11.5 V.
- Fuel filter very dirty.

If these points are O.K., the fault lies in the electric fuel pump itself.

Replace the electric fuel pump.





12.6 Removing and installing the electric fuel pump:

Remove the floor board from the luggage compartment and lift off the round cover plate (in the floor assembly).

Remove the electric plugs from the electric fuel pump.

Unscrew the inlet-union screw of the fuel line, applying counter-force at the fixed hexagonal section on the electric fuel pump.

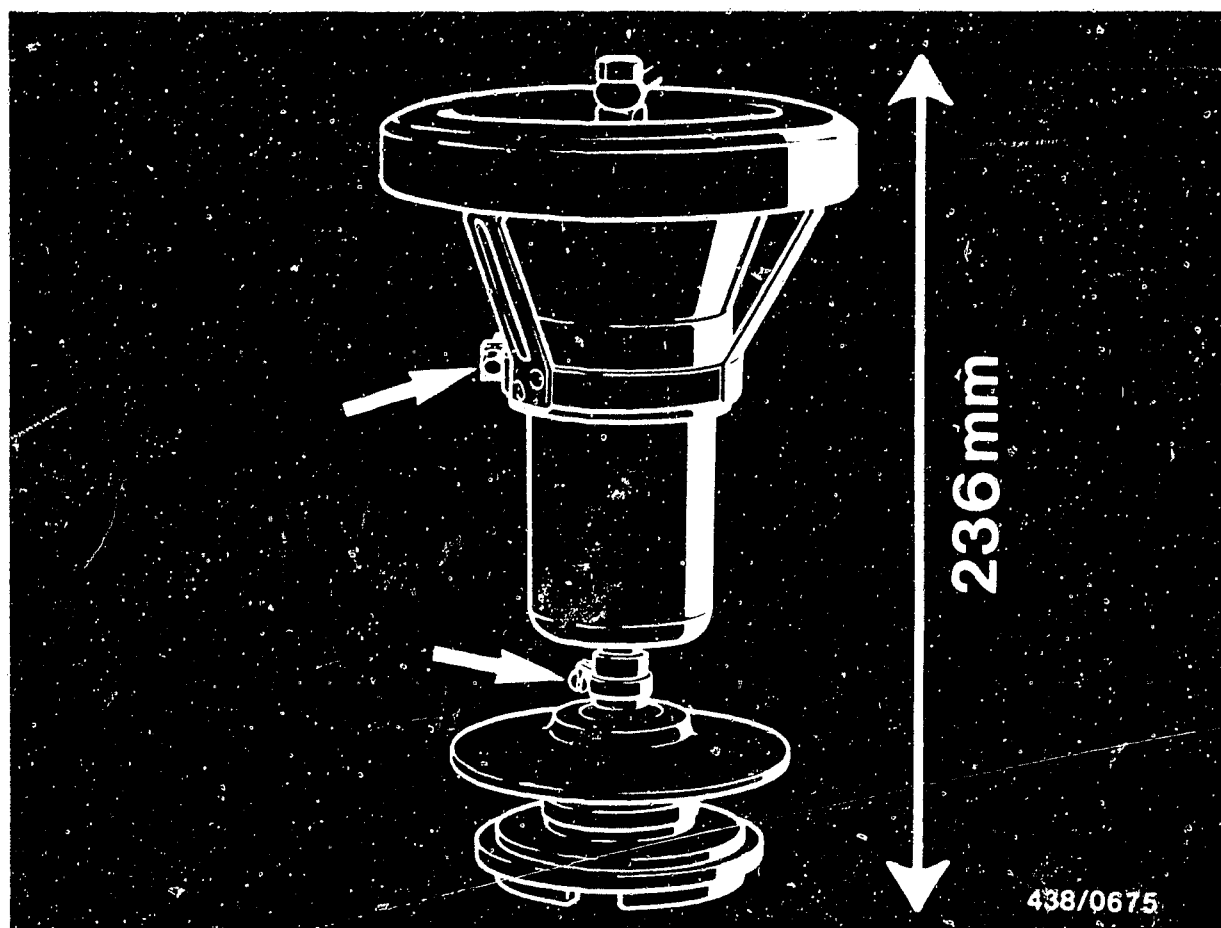




Loosen the clamping band for the rubber mounting of the electric fuel pump. To do this, use an offset screwdriver or a flex-head screwdriver. The flex-head screwdriver can be inserted through the specially provided hole (arrow; remove rubber grommet).

Lift complete unit - rubber mounting with electric fuel pump and intake strainer - out of the fuel tank.





Loosen the clamping bands for the intake strainer and rubber mounting (arrows) and remove both parts from the electric fuel pump.

Slip the intake strainer fully onto the intake fitting of the new electric fuel pump and, for the time being, lightly fasten the clamping band.

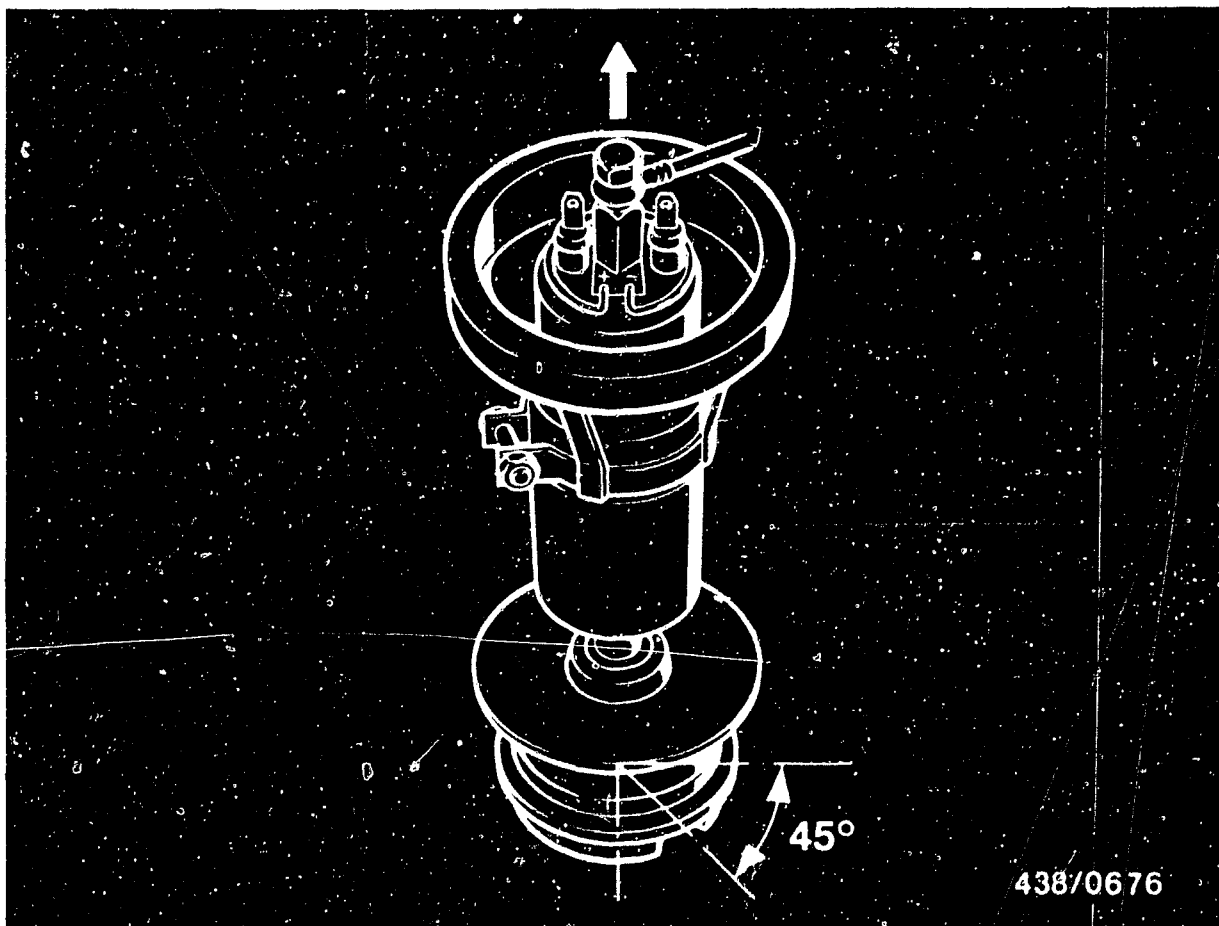
Fit the rubber mounting so that the distance between the bottom edge of the intake strainer and the top edge of the rubber mounting is 236 mm.

C5

Testing the electric fuel pump

Saab 99/900





Install the complete pump unit as follows in the fuel tank:

The two electric terminals must be at 90° to the direction of travel; positive terminal on the left-hand side as viewed from behind the vehicle.

Turn the intake strainer so that the centre of the intake opening is at approx. 45° at the rear right. Then finally tighten the clamping band of the intake strainer.

Arrow in picture = direction of travel.



12.7 Removing and installing the fuel filter (arrow):

Unscrew the inlet-union screws of both fuel lines, applying counter-force to the fixed hexagonal section of the fuel filter.

Loosen the fastening clamp and pull out the filter.

When installing, ensure the correct direction of flow and use new seal rings for the inlet-union screws.





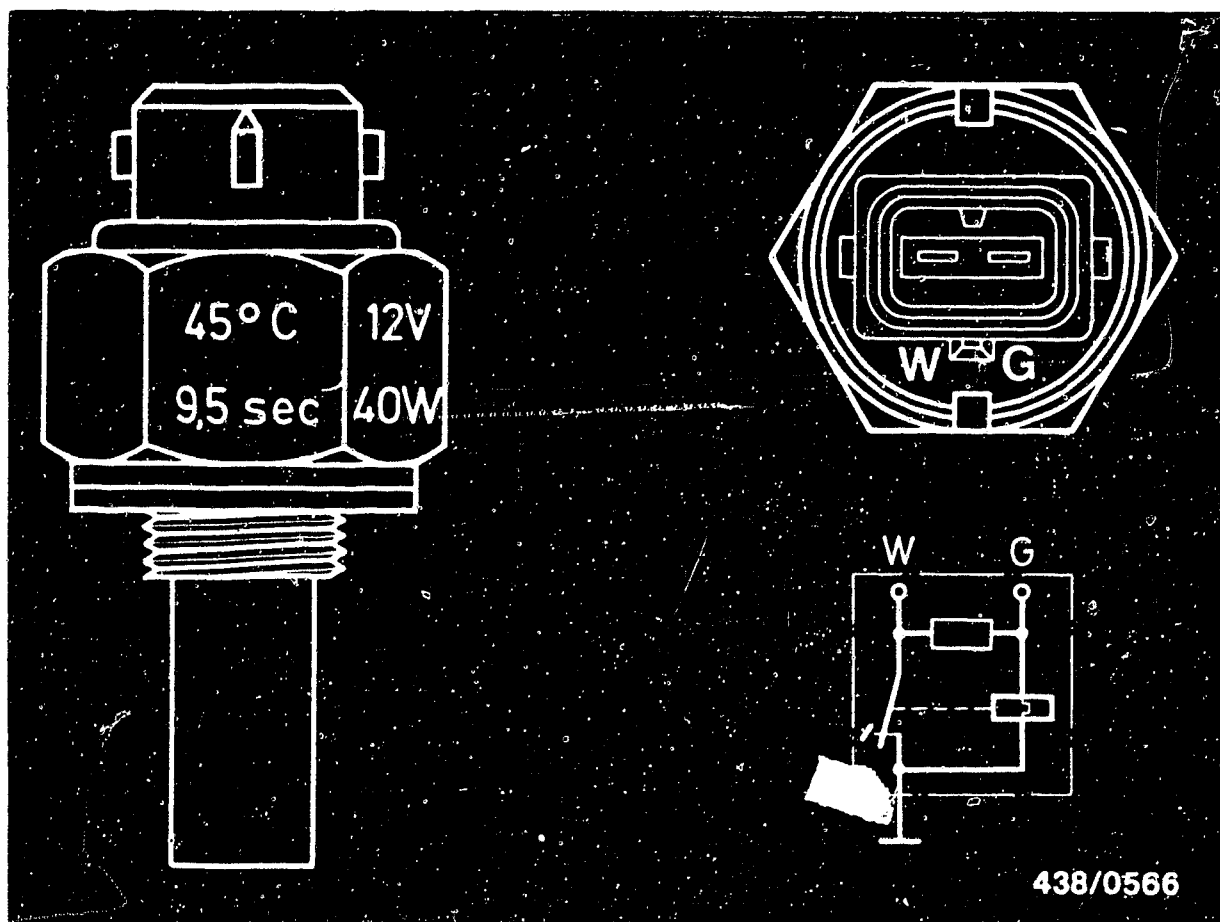
1 = Thermo-time switch
2 = Cold-start valve

13. Checking the cold-start system (thermo-time switch, cold-start valve).

13.1 Thermo-time switch:

Remove the thermo-time switch for testing





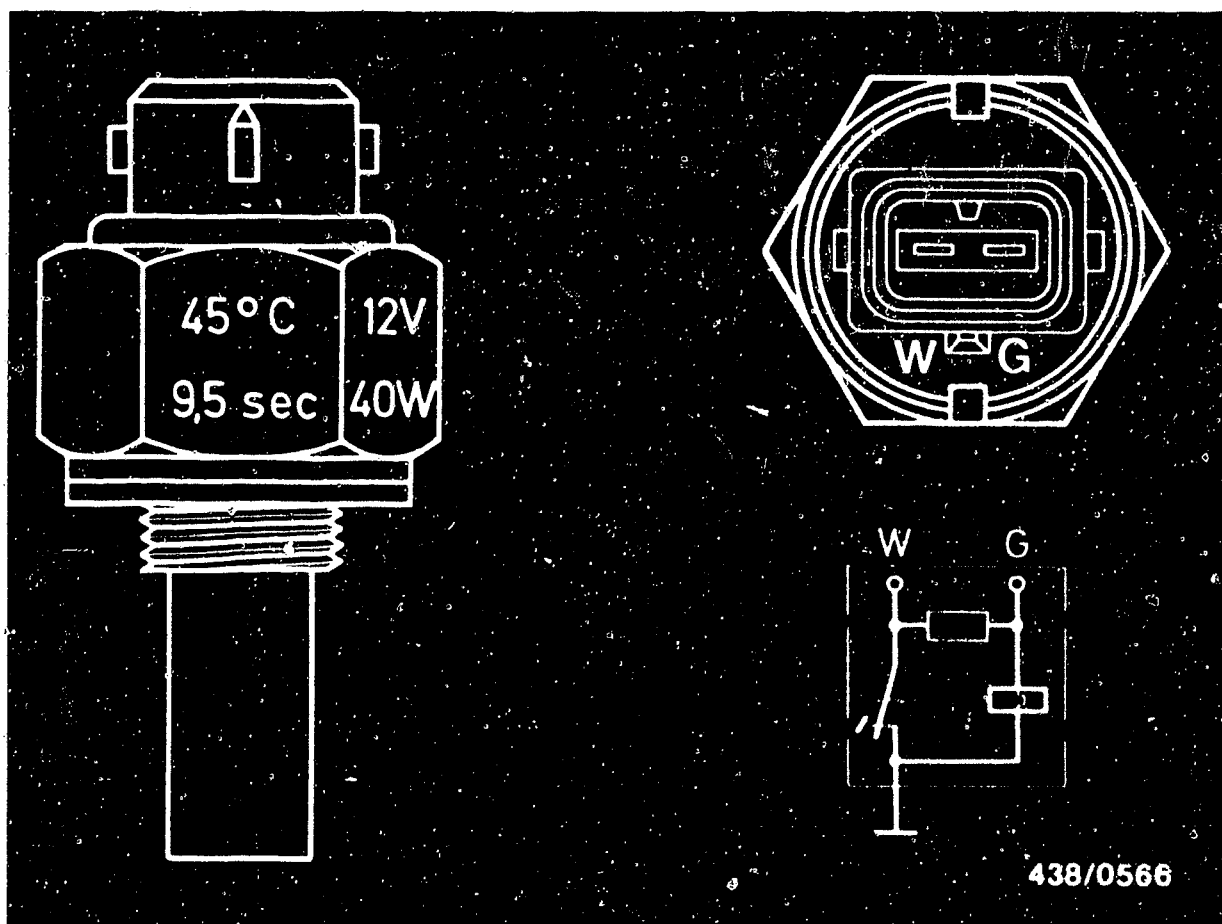
The thermo-time switch used in the Saab has a switching temperature of 45°C and a switching time at -20°C of 9.5 seconds. Both values are stamped on the hexagonal section of the thermo-time switch.

The removed thermo-time switch is tested using the ohmmeter in accordance with the specifications given below.

C9

Checking cold-start sys./t.-t. switch
Saab 99/900





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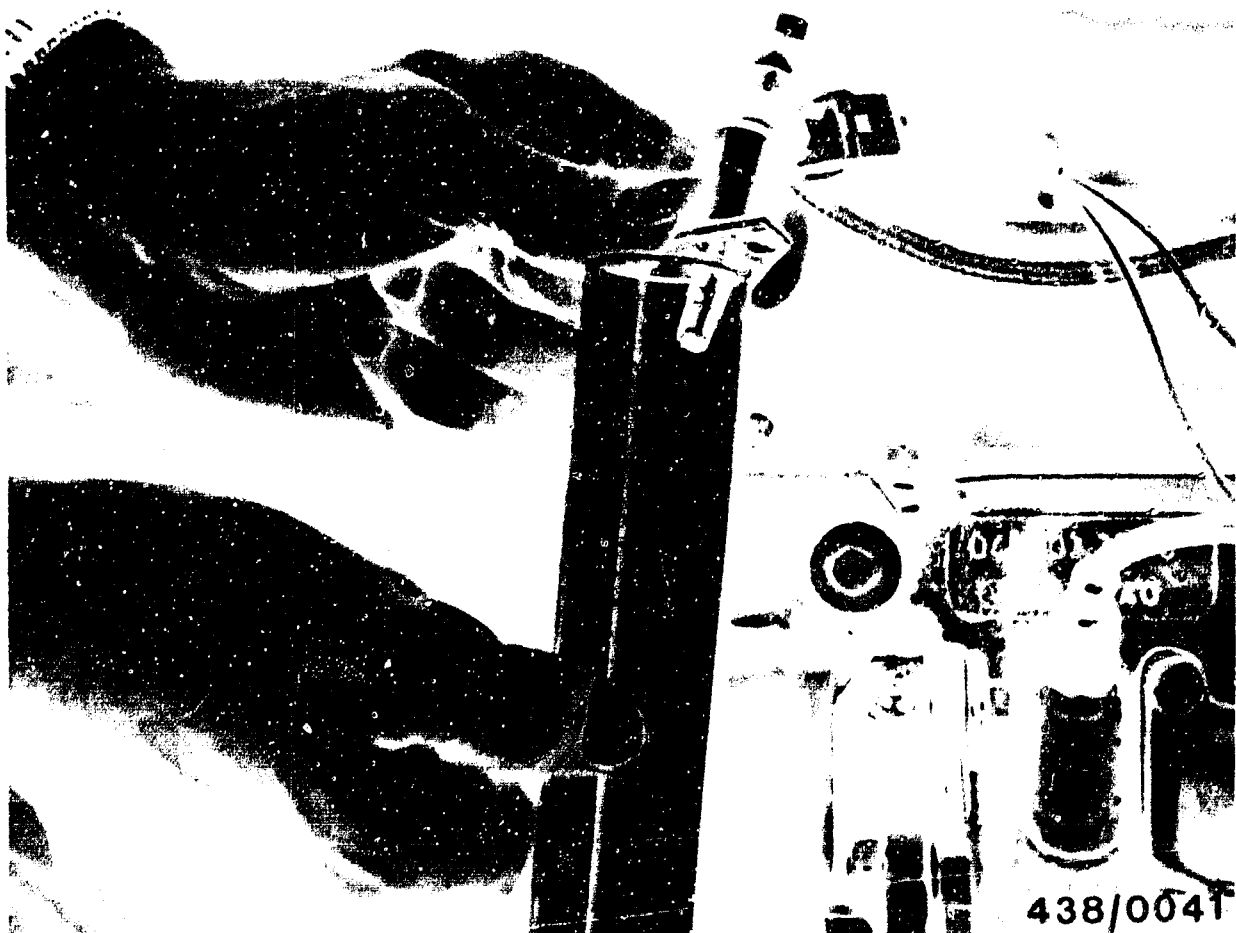
The temperatures for the thermo-time switch can easily be obtained with water. Cooling takes place in a freezer chest.

		Resistance measurement (Ω) between		
At a temperature below $^{\circ}\text{C}$	above $^{\circ}\text{C}$	Term. "G" and "ground" (housing)	Term. "W" and "ground" (housing)	Term. "G" and "W"
+40		30...40	0	30...40
	+50	55...85	120...160	55...85

C10

Checking cold-start sys./ t-t switch
Saab 99, 900





13.2 Start valve

Remove the start valve. Hose line remains connected. Pull off the plug and connect the start valve directly to ground and to terminal 15 (e.g. at the ignition coil) using connecting cable KDJE 7450/70.

Important note:

During this test, do not let the connecting cable touch B+. Danger of fire due to sparking!

Hold the start valve in a suitable container (e.g. the graduate).

Switch on the electric fuel pump by bridging the safety circuit.

Switch on the ignition (max. 30 seconds). The start valve must now open and spray fuel.



Switch off the ignition, remove the electric connecting cable and dry the nozzle of the start valve.

The safety circuit remains bridged so that the primary pressure is applied to the start valve.

No droplets of fuel must drip from the nozzle of the start valve during the next minute. Even if shaken and knocked, the start valve must not leak.

Then switch the electric fuel pump off again.

Replace the start valve if it does not open or if it leaks.

If a leaky start valve or a defective thermo-time switch has been replaced, it is necessary finally to adjust the idle speed with the engine at normal operating temperature.

Idle-speed adjustment is described on Coordinates F 3.



14. Checking the control pressures

14.1 Preliminary remarks:

The control pressures tested in the following are in each case governed by the warm-up regulator. If the test results are incorrect, however, this may also be due to faults which have nothing to do with the warm-up regulator.

These possible faults are:

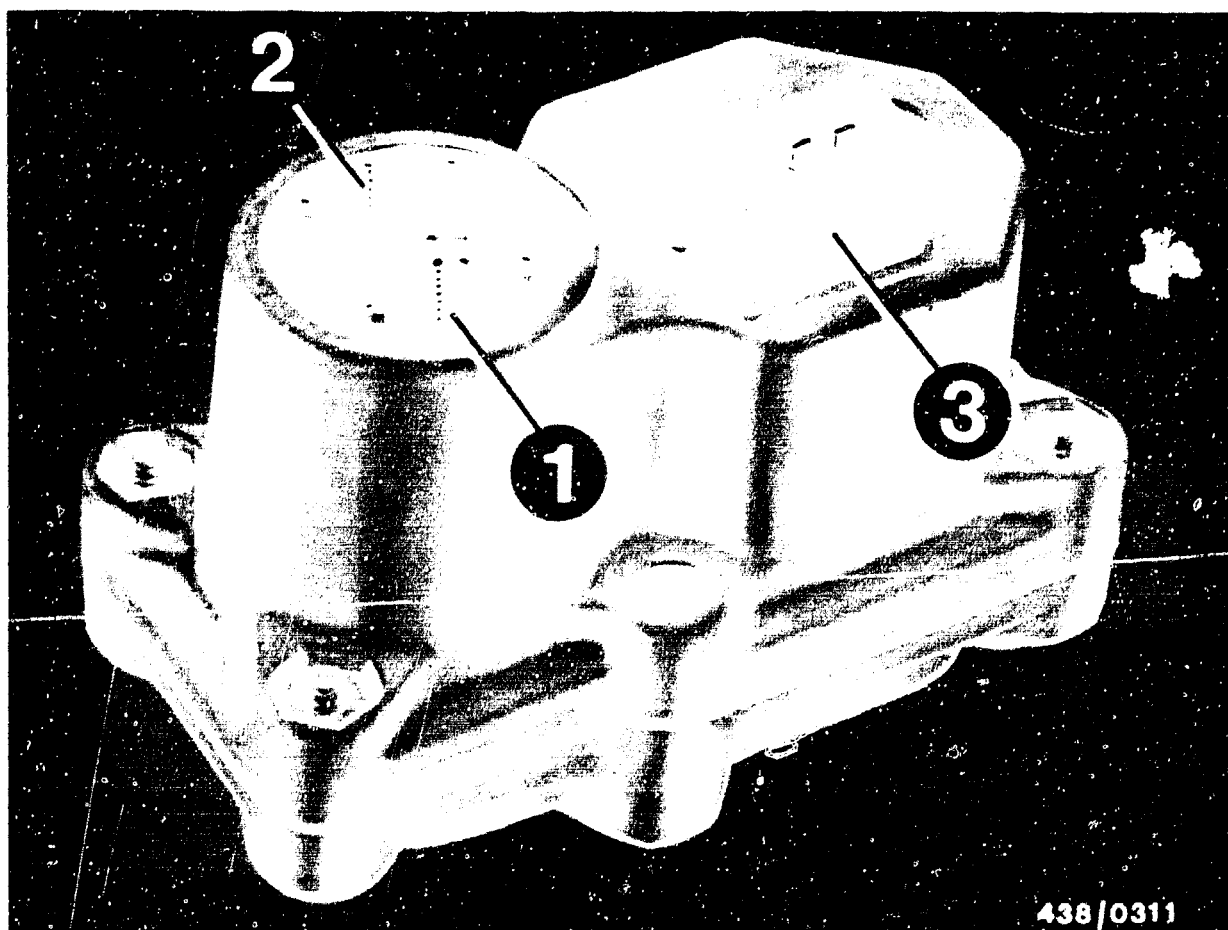
- No or too low a voltage at the electric connector.
- Fuel return from the warm-up regulator blocked or constricted.
- Too high a fuel delivery for the control-pressure circuit.

The testing of this control-pressure delivery is described as an additional test step at the beginning of the control pressure tests.

Test specification: 160...240 cm³/min.

Reference is made to the other possible causes of trouble in the respective test step.





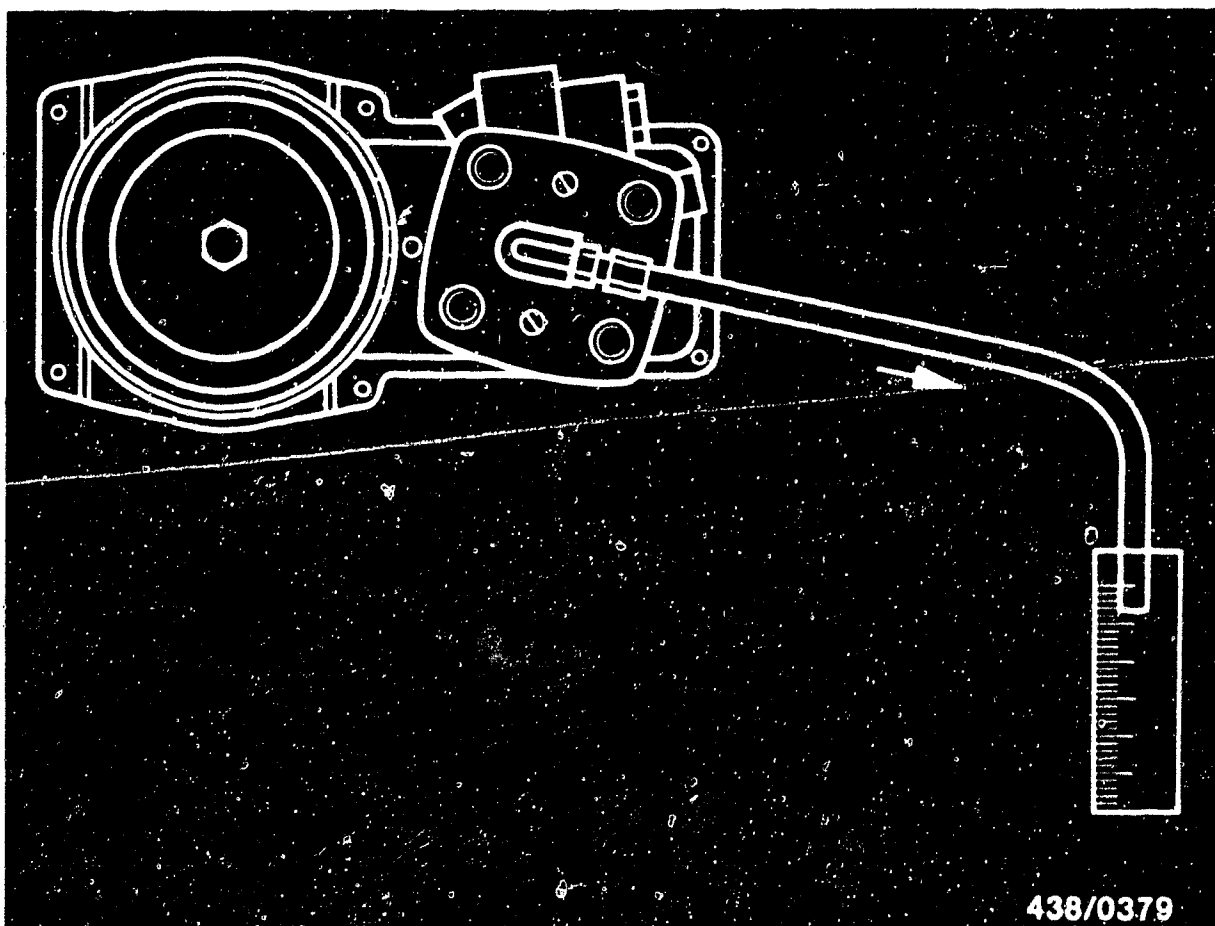
- 1 = Intake port (M 10 x 1)
- 2 = Return port (M 8 x 1)
- 3 = Electrical connection

14.2 Design of warm-up regulator

Warm-up regulator 0 438 140 020.

The warm-up regulator corresponds to the standard design, i.e. apart from control pressure "cold" and "warm" no other functions (such as full-load and altitude compensation) are performed.





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14.3 Checking the fuel delivery for the control-pressure circuit:

Before testing, make sure that the electric fuel pump is operating properly.

Test specification: min. 750 cm³/30 s.

Unscrew the control-pressure line (to the warm-up regulator) from the fuel distributor.

Connect one of the two connecting hoses of the pressure tester KDJE-P 100 (previously KDEP 1034) to the control-pressure port of the fuel distributor (thread M 12 x 1.5) and hold hose in graduate (approx. 0.5 litre capacity).



Switch on the electric fuel pump for 1 minute by bridging the safety circuit. Measure delivery.

Test specification: 160...240 cm³/min.

If the measured value is outside tolerance, the fault is in the fuel distributor.

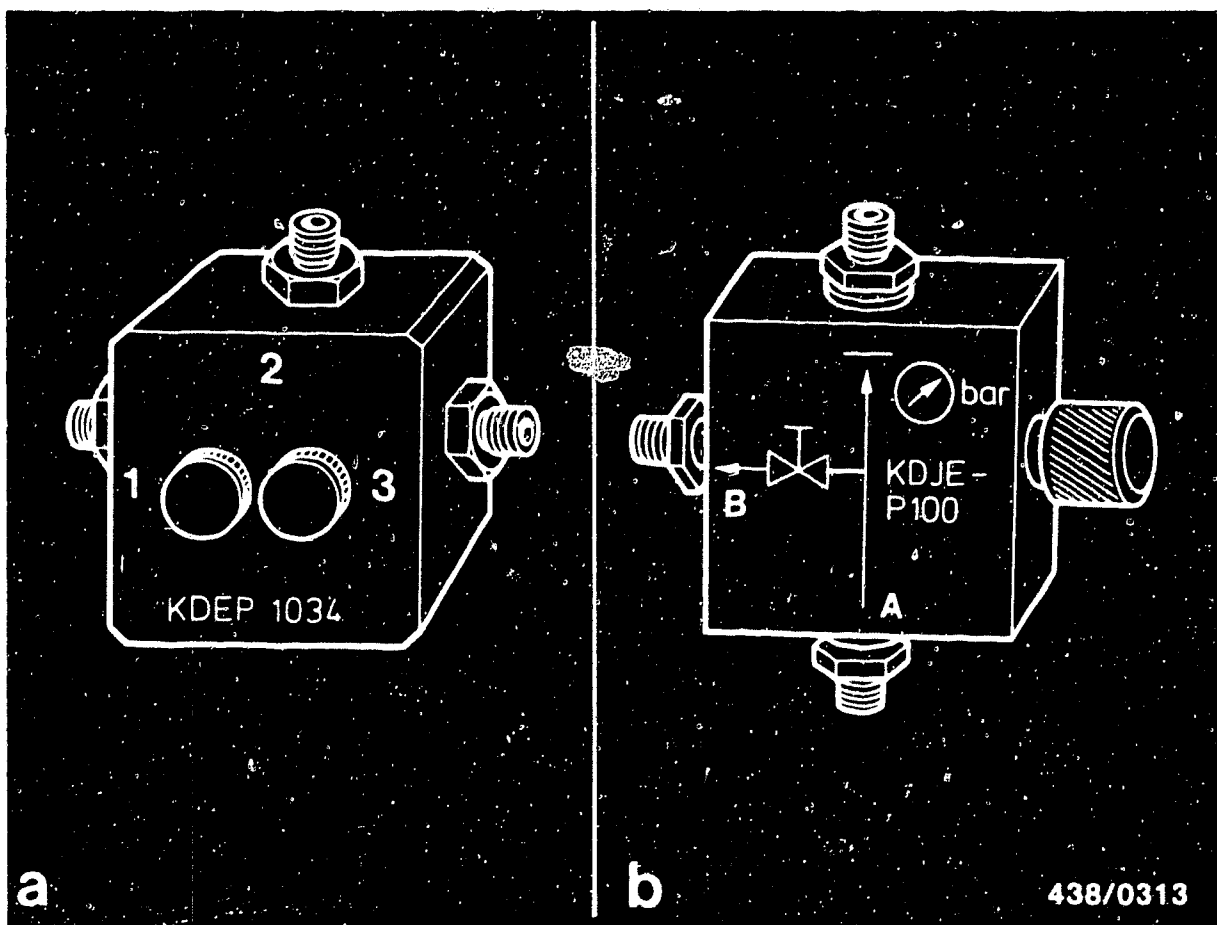
Replace the fuel distributor.

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Checking the control pressures

Saab 99, 900





14.4 Mounting the pressure tester KDJE-P 100 (formerly KDEP 1034):

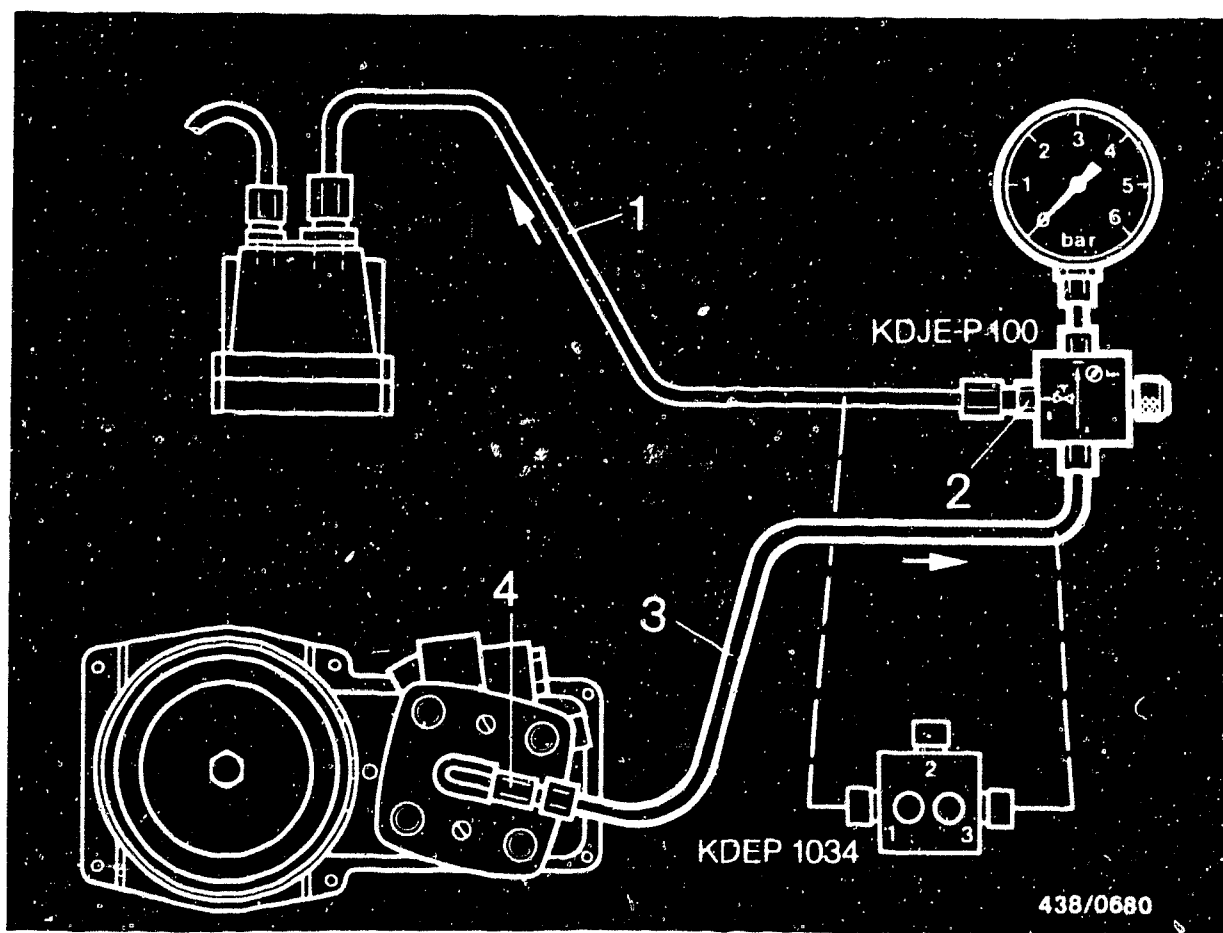
The pressure tester KDEP 1034 is equipped with a three-way valve with 2 separate valve screws. The connections of the directional-control valve are numbered (Fig. a). Since the end of 1979 the pressure tester KDJE-P 100 has been supplied. Its directional-control valve has only one valve screw (Fig. b). The connections of this directional-control valve are identified by symbols:

A = Inlet (from the fuel distributor)

B = Outlet (to the warm-up regulator)

Caution:

When the directional-control valve is not in use, always keep the valve screw(s) open in order to relieve the pressure on the seal rings.



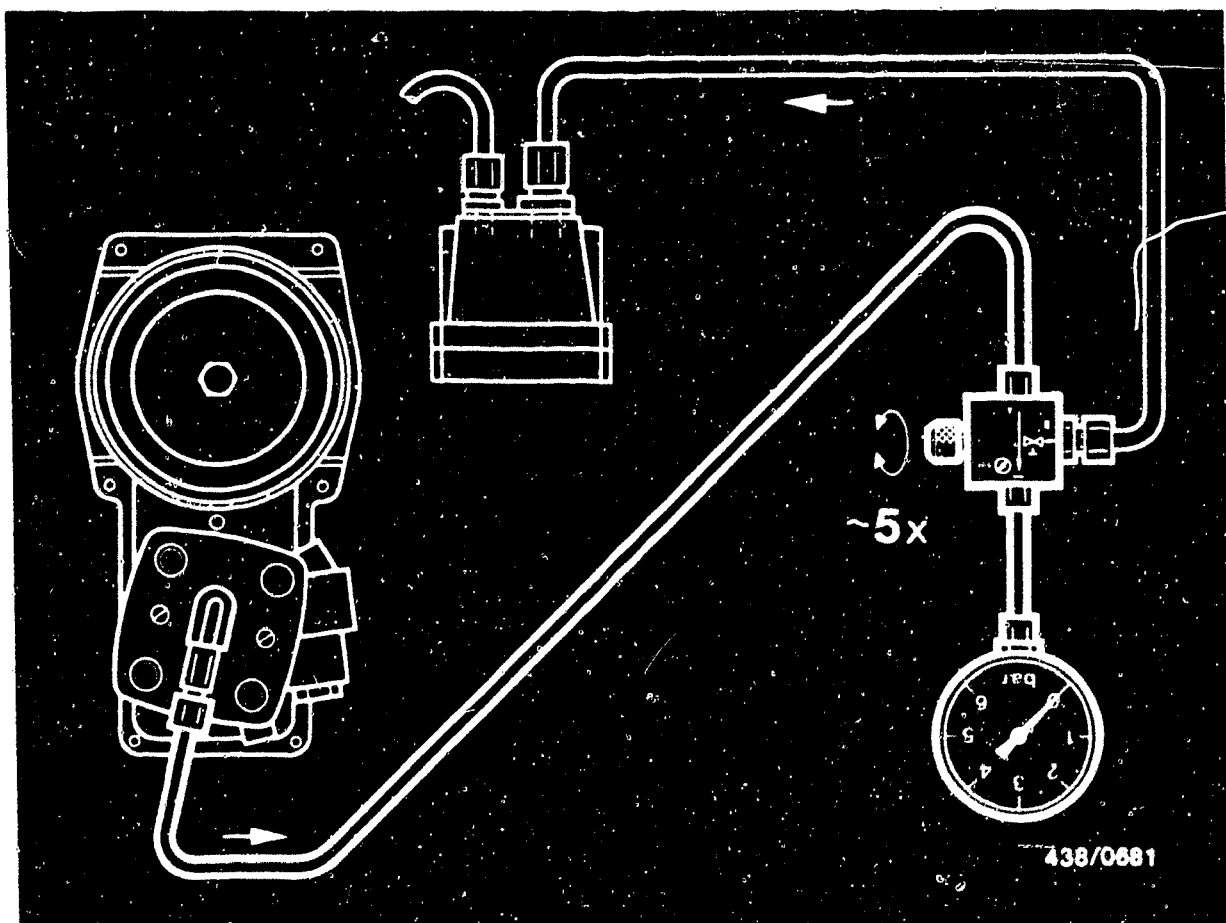
The directional-control valve of the pressure tester is connected into the control-pressure line from the fuel distributor to the warm-up regulator.

Unscrew the control-pressure line (1) on the fuel distributor and connect to the outlet fitting B or 1 (2) of the directional-control valve.

Connect the hose line (3) of the pressure tester to the control-pressure connection port (4) of the fuel distributor.

Suspend the pressure gauge from the engine-compartment lid (possibly using a wire hook).





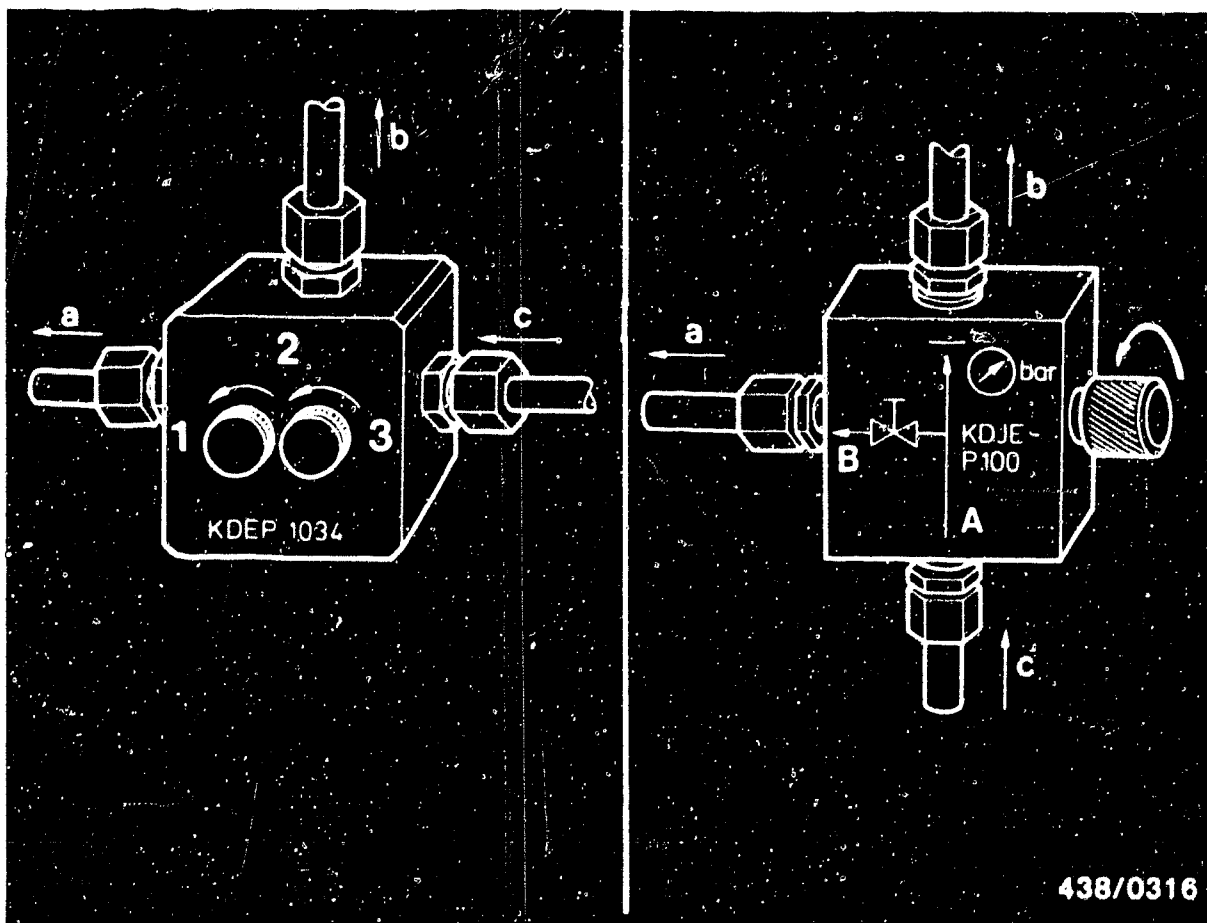
14.5 Bleeding the pressure tester

Disconnect the electric plug from the warm-up regulator. Let the pressure gauge hang down (hose fully extended). Switch on the electric fuel pump by bridging the electrical safety circuit.

Open and close the valve screw(s) of the directional-control valve in a 10-second rhythm about 5 times.

Then hang the pressure gauge from a suitable support (e.g. from one of the struts under the engine hood).

Open valve screw of directional-control valve (both screws in the case of KDEP 1034) (turning to the left).



- a = To warm-up regulator
- b = To pressure gauge
- c = From fuel distributor

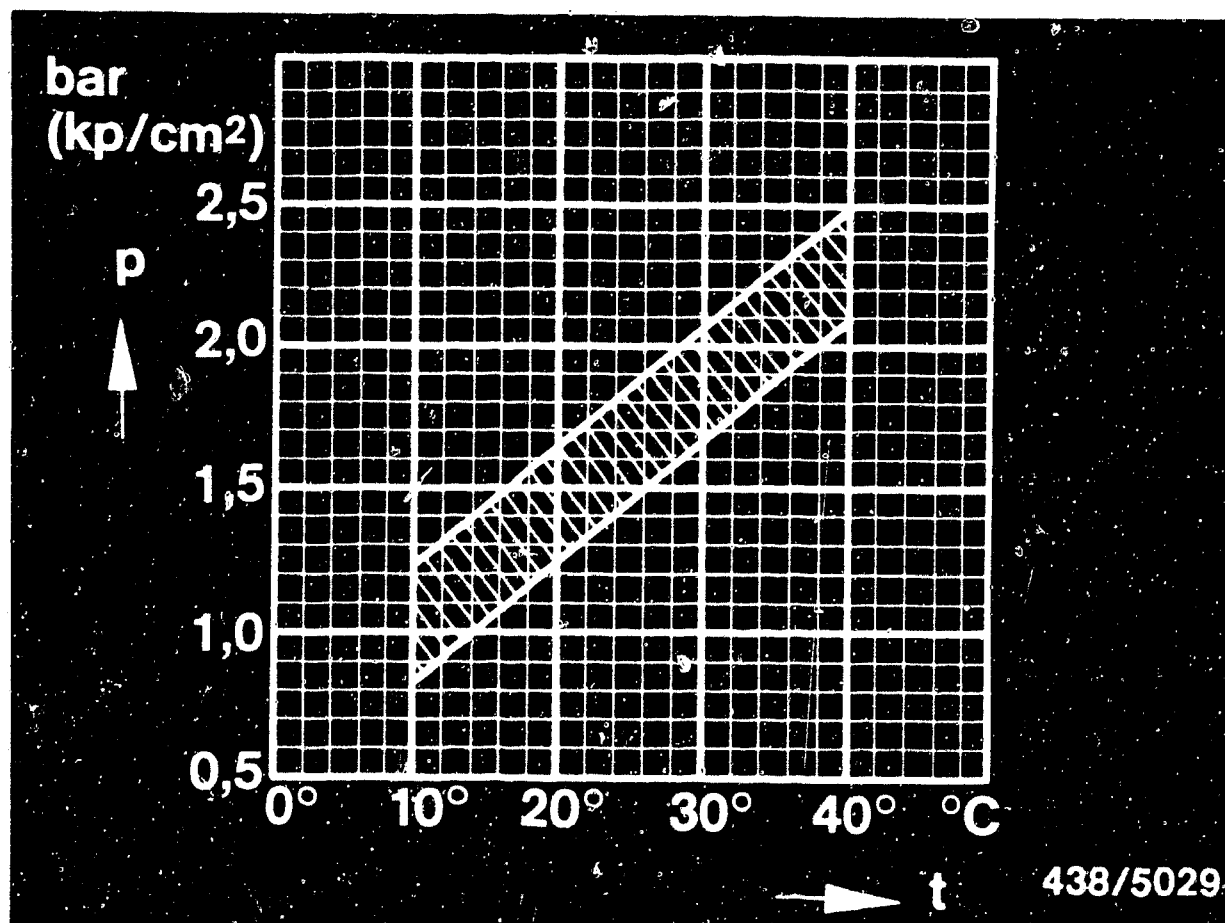
14.6 Testing the "cold" control pressure.

The test is performed with the engine switched off. The engine must be cold. For this purpose, the engine should have been switched off for several hours, preferably overnight.

Pull off the plug from the warm-up regulator.

Open the valve screw of the directional-control valve (both screws in the case of KDEP 1034). Switch on the electric fuel pump by bridging the electrical safety circuit.

The pressure gauge now indicates the "cold" control pressure.



p = Control pressure (bar or kgf/cm² gauge pressure)
t = Ambient temperature (°C)

Warm-up regulator Part No.: 0 438 140 020
0 438 140 111

Calculate the nominal control pressure in accordance with the ambient temperatures in the graph.

Example: Ambient temperature = 20°C
Nominal control pressure = 1.25...1.65 bar
(gauge pressure)

If the measured "cold" control pressure differs from the nominal value, this may be due to one of the following faults:

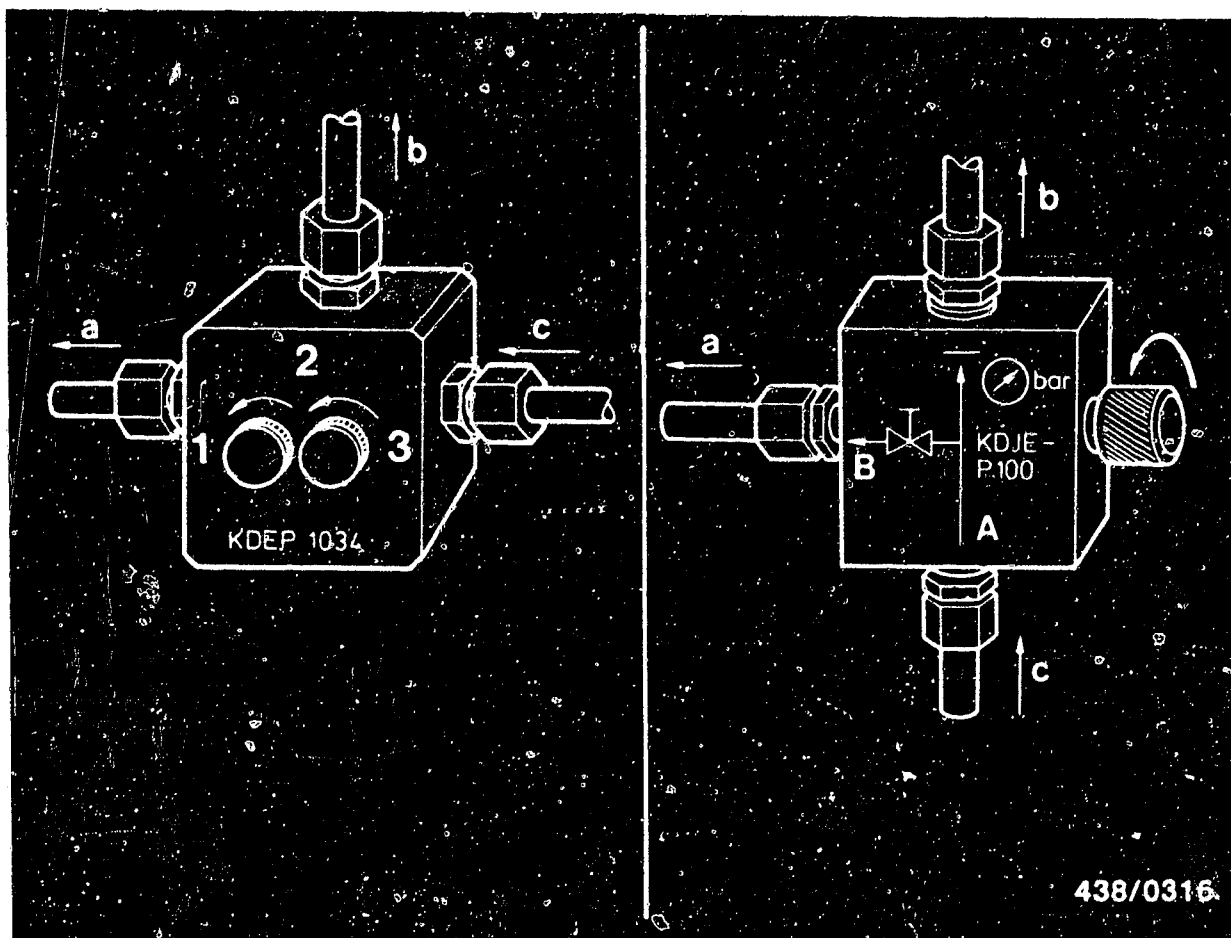
- Fuel delivery for the control-pressure circuit too low or too high. Test fuel delivery.
Test value: 160...240 cm³/min.
- Fuel return from warm-up regulator blocked or constricted (if control pressure too high).
Eliminate restriction.
- Warm-up regulator defective. Replace warm-up regulator.

If the warm-up regulator has failed due to fouling, the new warm-up regulator must be provided with tube fitting 1 433 356 802. Tightening torque 20...22 Nm (2.0...2.2 kgfm).

When the warm-up regulator has been replaced or a fault remedied, carry out the idle adjustment with the engine at normal operating temperature.

Idle adjustment is described on Coordinate F 3.





a = To warm-up regulator
 b = To pressure gauge
 c = From fuel distributor

14.7 Checking the "warm" control pressure:

Warm-up regulator Part No.: 0 438 140 020, 0 348 140 111

The test is carried out with the engine switched off.
 The temperature of the engine is not important.
 Open the valve screw of the directional-control valve
 (both screws in the case of KDEP 1034).
 Switch on the electric fuel pump by bridging the electrical safety circuit.

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Checking the control pressures
 Saab 99, 900



Attach the plug to the warm-up regulator.
Control pressure now rises (the warm-up regulator in the process of shutting off), until the "warm" control pressure is reached.

Test specification of "warm" control pressure:
3.4...3.8 bar (3.5...3.9 kgf/cm²) gauge pressure

If the measured "warm" control pressure differs from the test specification, this may be due to one of the following faults:

If control pressure too high:

- Fuel delivery for the control-pressure circuit too high.
Test fuel delivery.
Test specification: 160...240 cm³/min.
- Fuel return from the warm-up regulator blocked or constricted.
Eliminate constriction.
- Warm-up regulator has hydraulic defect.
Replace warm-up regulator.



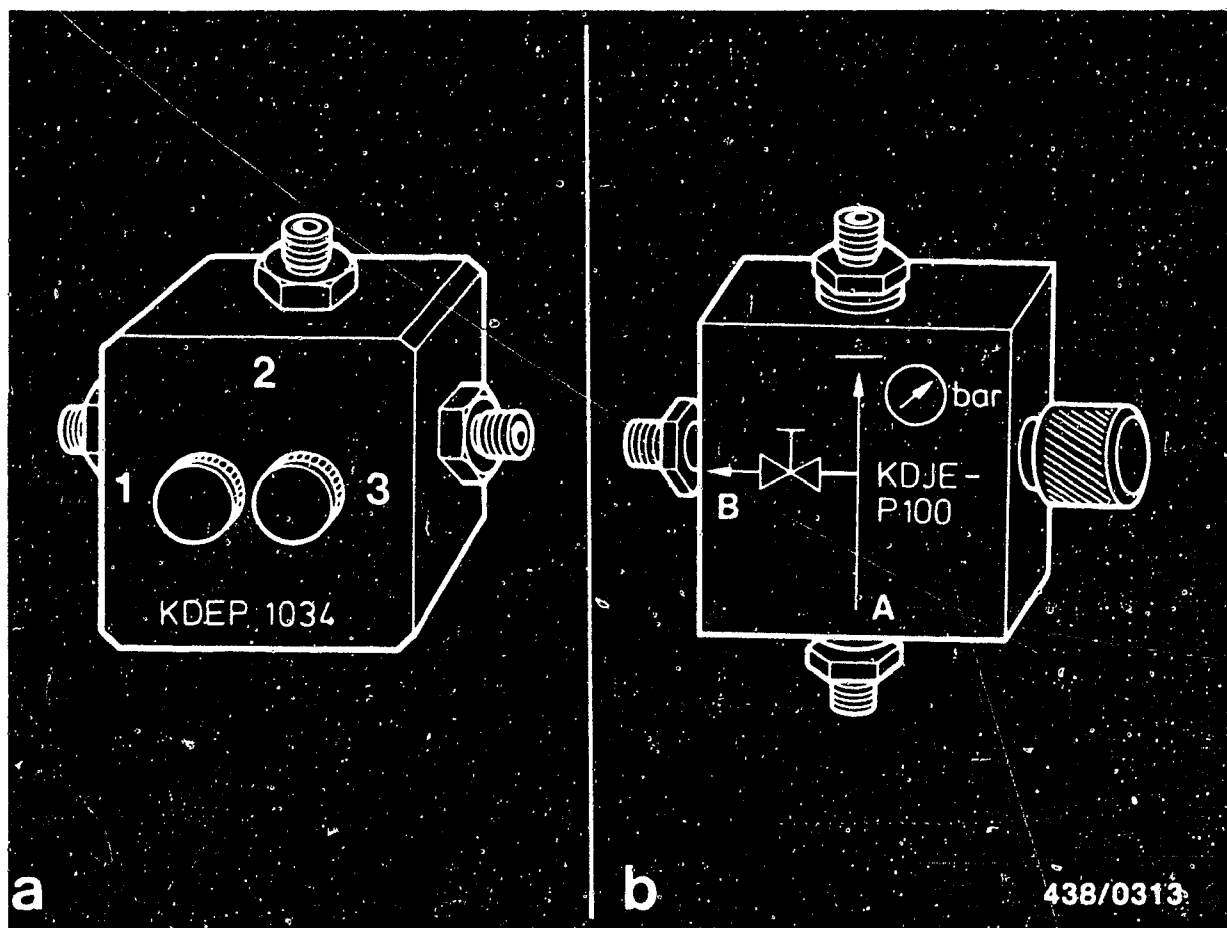
If control pressure too low:

- Power supply open-circuit.
Eliminate open circuit. Ensure that the plug is contacting properly.
- Battery voltage too low, voltage drop.
Eliminate voltage drop. Minimum voltage at connector 11.5 V.
If necessary, repeat test with engine running in order to obtain the normal generator voltage of approx. 14 V when the vehicle is in operation.
- Fuel delivery for the control-pressure circuit too low.
Test fuel delivery.
Test specification: 160...240 cm³/min.
- Warm-up regulator defective. Heating coil open-circuit. Hydraulic defect. Replace warm-up regulator.

If the warm-up regulator has been replaced or a defect has been eliminated, it is necessary finally to adjust the idle speed with the engine at normal operating temperature.

Idle-speed adjustment is described on Coordinates F 3.



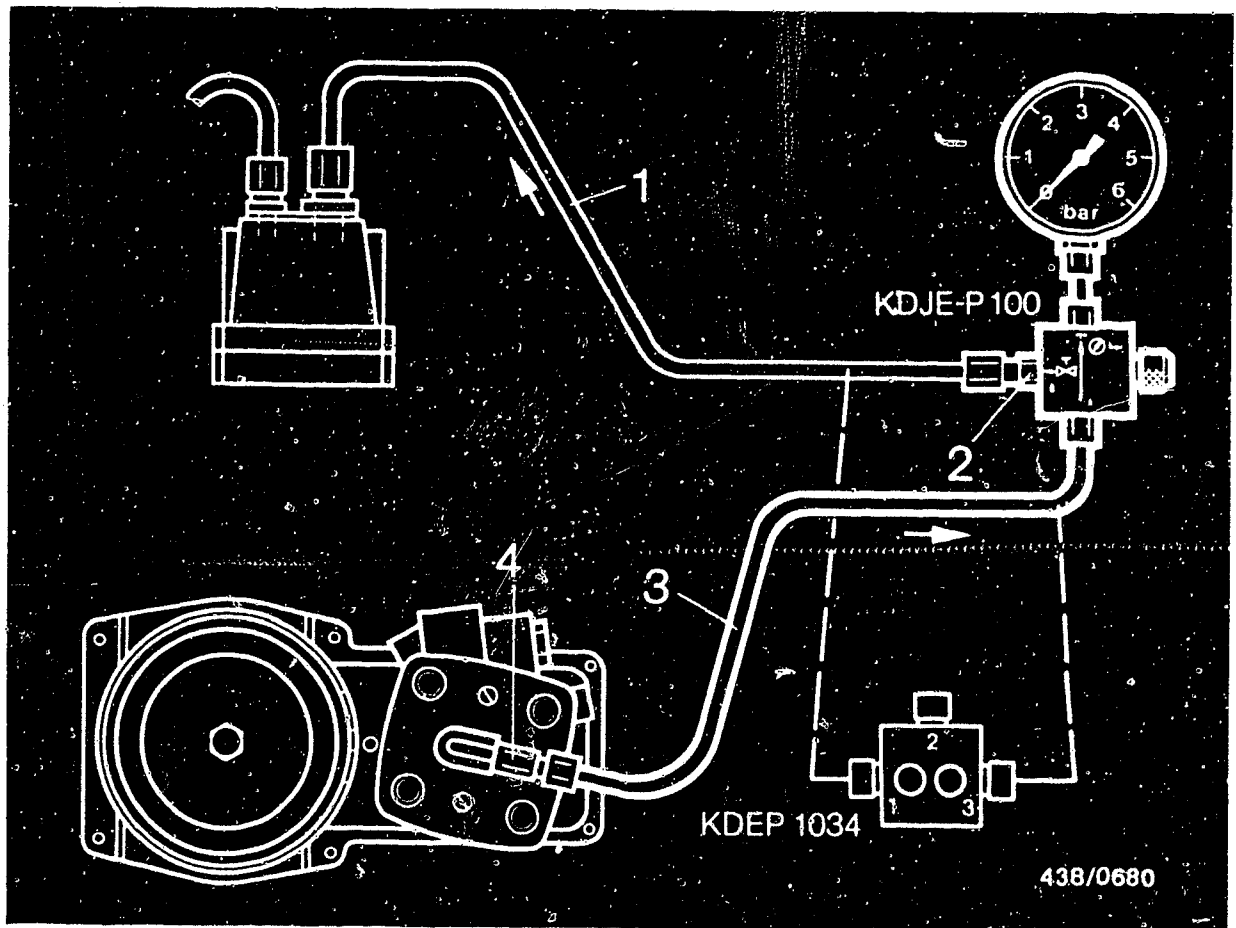


15. Testing and adjusting the primary (system) pressure:

15.1 Mounting the pressure tester KDJE-P 100 (formerly KDEP 1034):

The pressure tester KDEP 1034 is equipped with a three-way valve with 2 separate valve screws. The connections of the directional-control valve are numbered (Fig. a). Since the end of 1979 the pressure tester KDJE-P 100 has been supplied. Its directional-control valve has only one valve screw (Fig. b). The connections of this directional control valve are identified by symbols:
 A = Inlet (from the fuel distributor)
 B = Outlet (to the warm-up regulator)





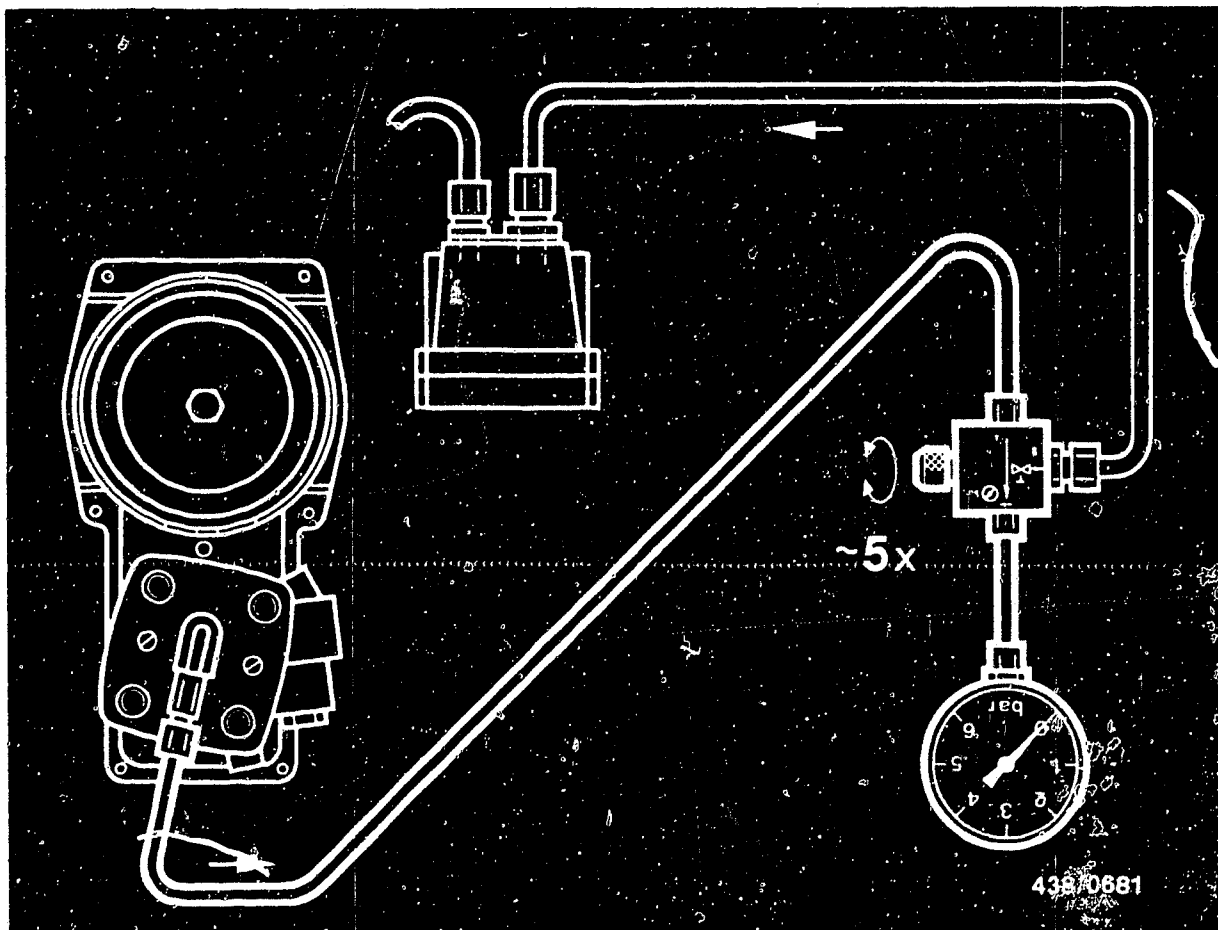
Caution:

When the directional-control valve is not in use, always keep the valve screw(s) open in order to relieve the pressure on the seal rings.

The directional-control valve of the pressure tester is connected into the control-pressure line from the fuel distributor to the warm-up regulator.

Unscrew the control-pressure line (1) on the fuel distributor and connect to outlet fitting B or 1 (2) of the directional-control valve.

Connect the hose line (3) of the pressure tester to the control-pressure connection port (4) of the fuel distributor. Suspend the pressure gauge from the engine-compartment lid (possibly using a wire hook).



15.2 Bleeding the pressure tester

Disconnect the electric plug from the warm-up regulator and the auxiliary-air device.

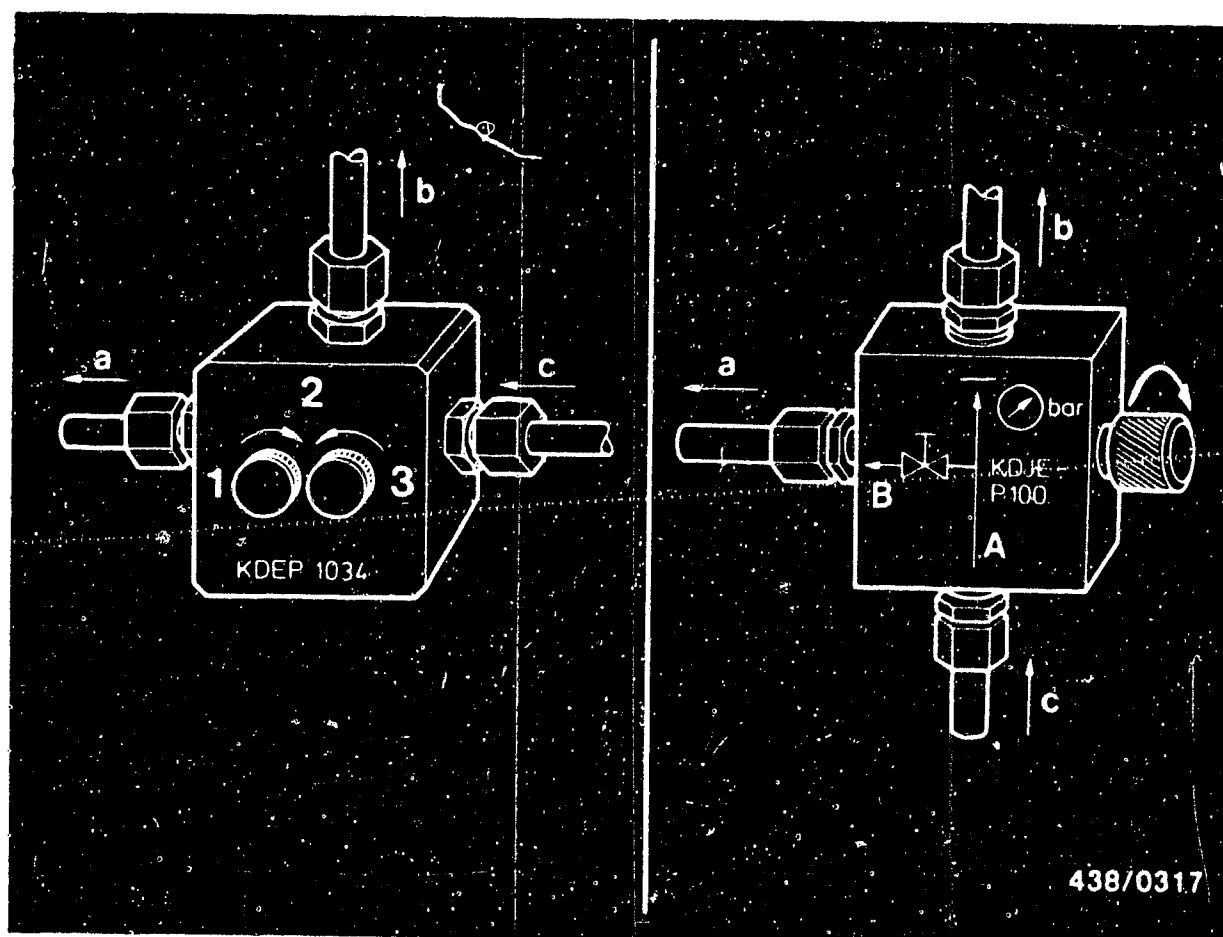
Let the pressure gauge hang down (hose fully extended). Switch on the electrical fuel pump by bridging the electrical safety circuit.

Open and close the valve screw(s) of the directional-control valve in a 10-second rhythm about 5 times. Then hang the pressure gauge from a suitable support (e.g. from one of the struts under the engine hood).

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Testing/adjusting the primary pressure
Saab 99, 900





a = To warm-up regulator
 b = To pressure gauge
 c = From fuel distributor

15.3 Testing the primary pressure:

The test is performed with the engine switched off. The temperature of the engine is not important. Close the valve screw of directional-control valve KDJE-P 100. In the case of KDEP 1034, close valve screw 1, open valve screw 3. Switch on the electric fuel pump by bridging the electrical safety circuit. The pressure gauge now indicates the primary pressure.

Fuel distributor Part No.	Test specifications - Primary pressure (gauge pressure)
0 438 100 023	<u>4.5...5.2 bar</u> (4.6...5.3 kgf/cm ²)

Possible causes for too low a primary pressure:

- Fuel supply faulty.
(Delivery of electric fuel pump too low).
- Primary pressure set incorrectly.

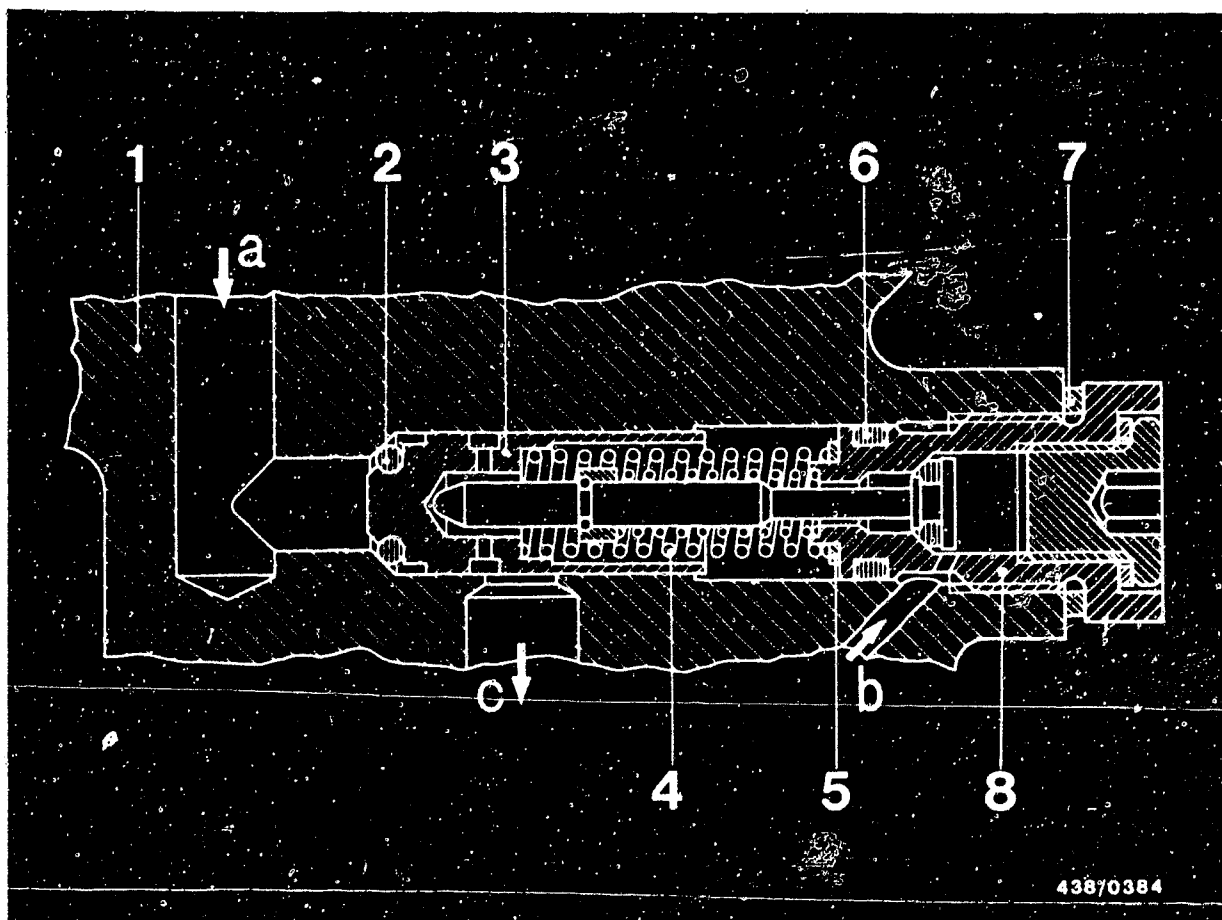
A precondition for readjustment of the primary pressure is always that the fuel supply is in order.
Test specification: 750 cm³/30 s.

Possible causes for too high a primary pressure:

- A constriction in the return line leading to the fuel tank.
- Primary-pressure regulator set incorrectly.

For this reason, before readjusting too high a primary pressure, always first check the condition of the return line leading to the fuel tank.



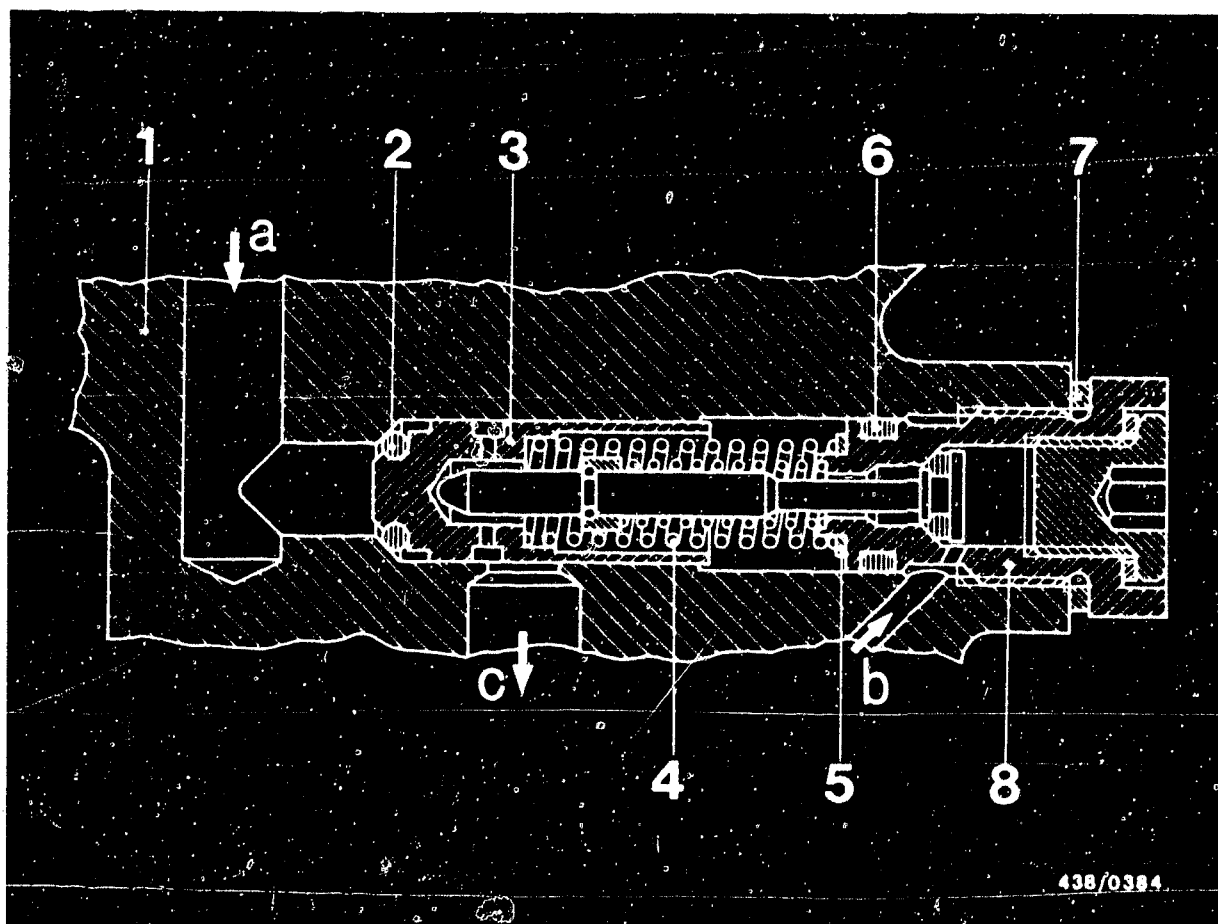


- | | |
|------------------------------|--------------------|
| a = Primary pressure | 4 = Control spring |
| b = From warm-up regulator | 5 = Shim(s) |
| c = Fuel return | 6 = O-ring |
| 1 = Fuel-distributor housing | 7 = Flat seal ring |
| 2 = O-ring | 8 = Screw plug |
| 3 = Control piston | |

15.4 Adjusting the primary pressure:

Fuel distributor Part No.	Primary-pressure adjustment value (gauge pressure)
0 438 100 023	<u>4.7...4.9 bar</u> (4.8...5.0 kgf/cm ²)





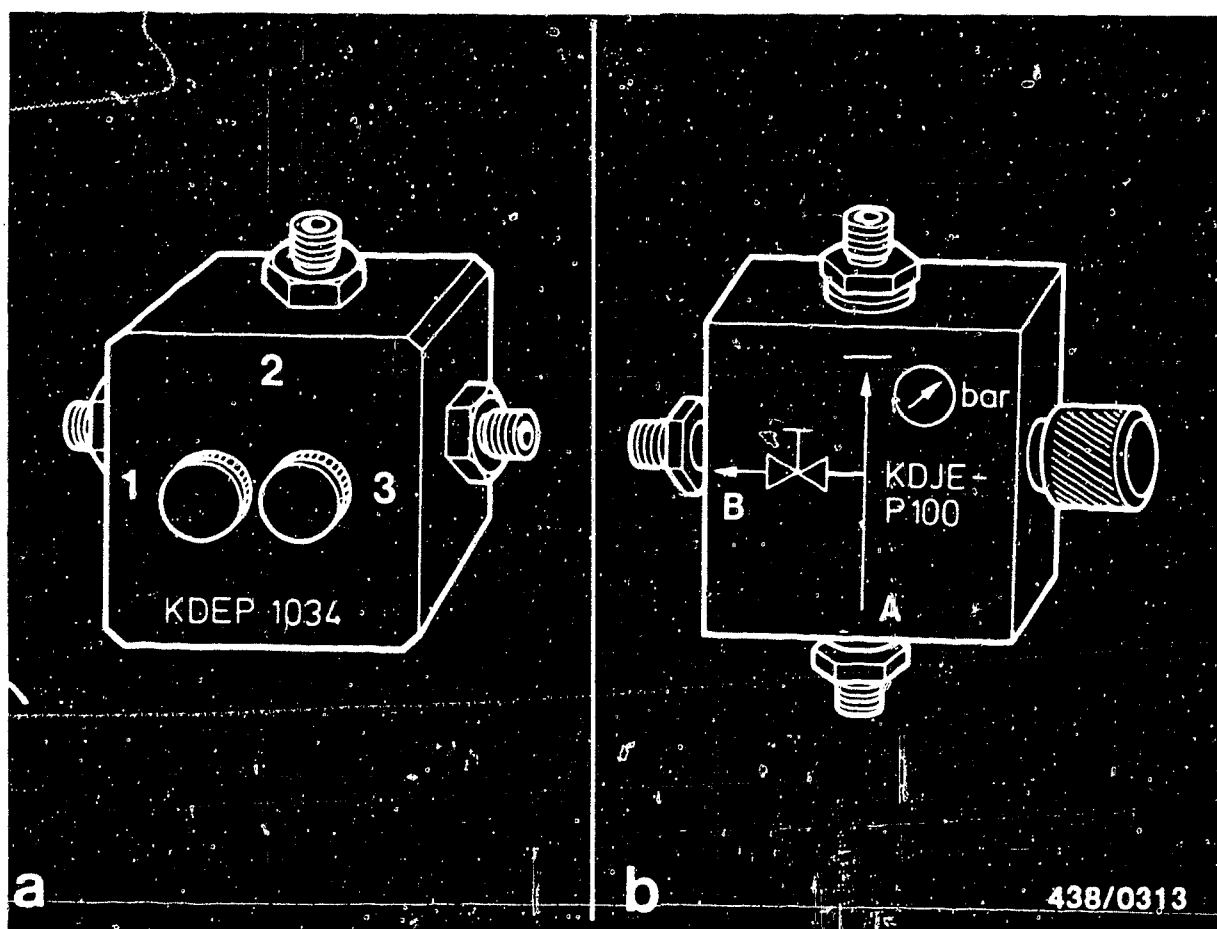
The primary pressure is readjusted by replacing the shims (Item 5).

Note: 0.1 mm more of shim thickness means about 0.15 bar pressure increase and vice versa.

To do this, screw out the large screw plug (Item 8) together with the push valve. After carrying out the adjustment, always fit the screw plug with a new flat seal ring (Item 7) and O-ring (Item 6).

The control piston (Item 3) of the primary-pressure regulator must not be lost. It was matched specially to the fuel distributor housing in the manufacturing plant and therefore is the only part of the primary-pressure regulator which must not be replaced.





16. Testing the entire fuel system for leaks.

16.1 Mounting the pressure tester KDJE-P 100 (formerly KDEP 1034):

The pressure tester KDEP 1034 is equipped with a three-way valve with 2 separate valve screws. The connections of the directional-control valve are numbered (Fig. a). Since the end of 1979 the pressure tester KDJE-P 100 has been supplied. Its directional-control valve has only one valve screw (Fig. b).



The connections of this directional-control valve are identified by symbols:

A = Inlet (from the fuel distributor)

B = Outlet (to the warm-up regulator)

Caution:

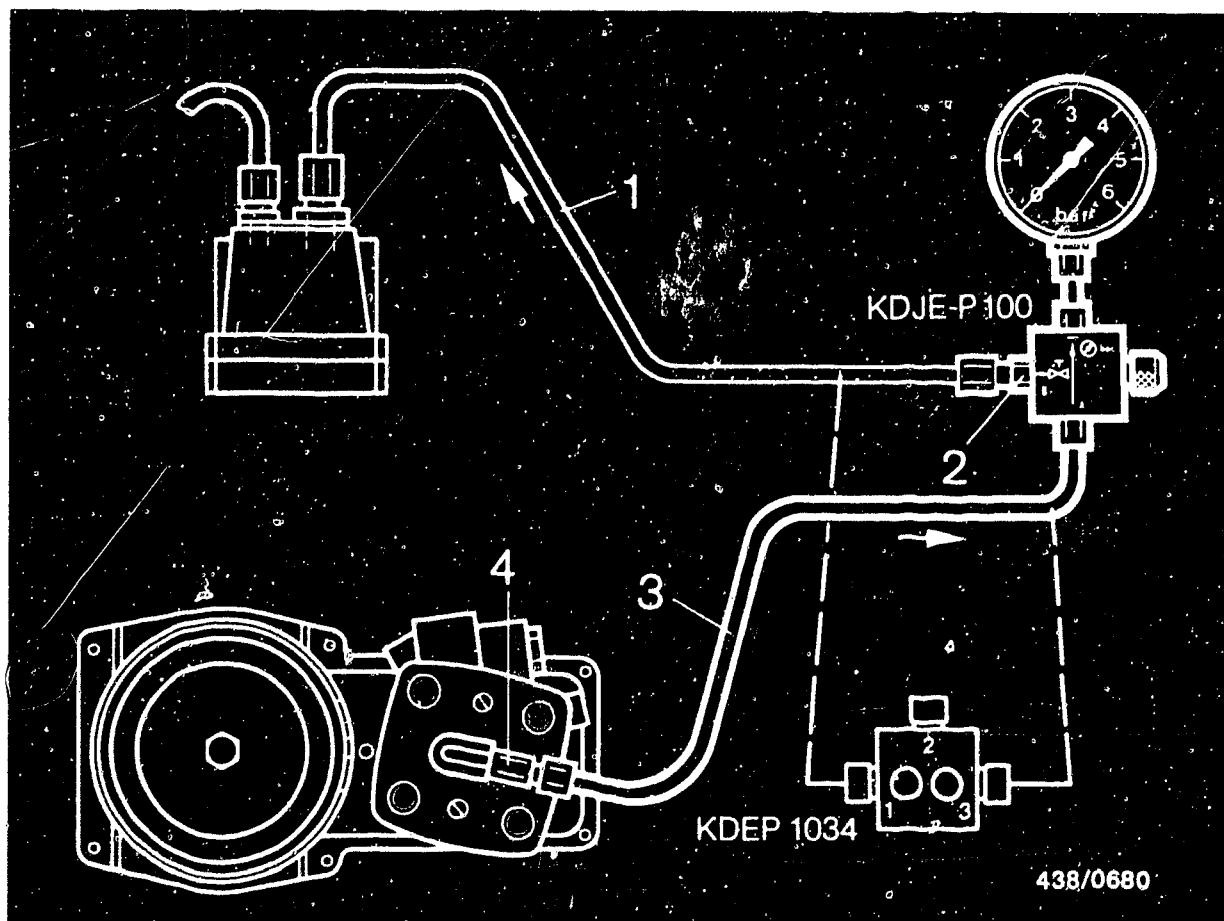
When the directional-control valve is not in use, always keep the valve screw(s) open in order to relieve the pressure on the seal rings.

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Leak test on fuel system

Saab 99, 900





The directional-control valve of the pressure tester is connected into the control-pressure line from the fuel distributor to the warm-up regulator.

Unscrew the control pressure line (1) on the fuel distributor and connect to outlet fitting B or 1 (2) of the directional-control valve.

Connect the hose line (3) of the pressure tester to the control-pressure connection port (4) of the fuel distributor.

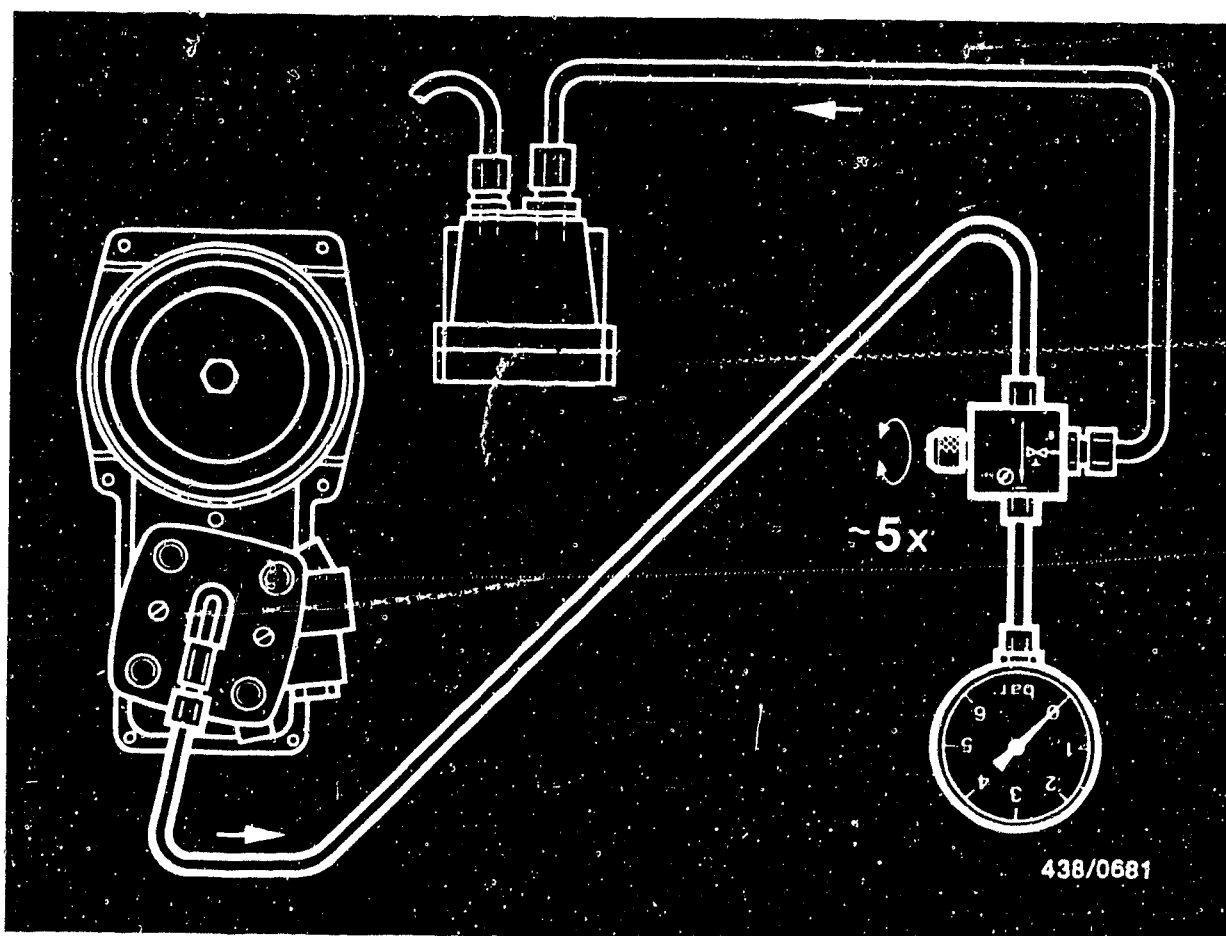
Suspend the pressure gauge from the engine-compartment lid (possibly using a wire hook).

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Leak test on fuel system

Saab 99/900





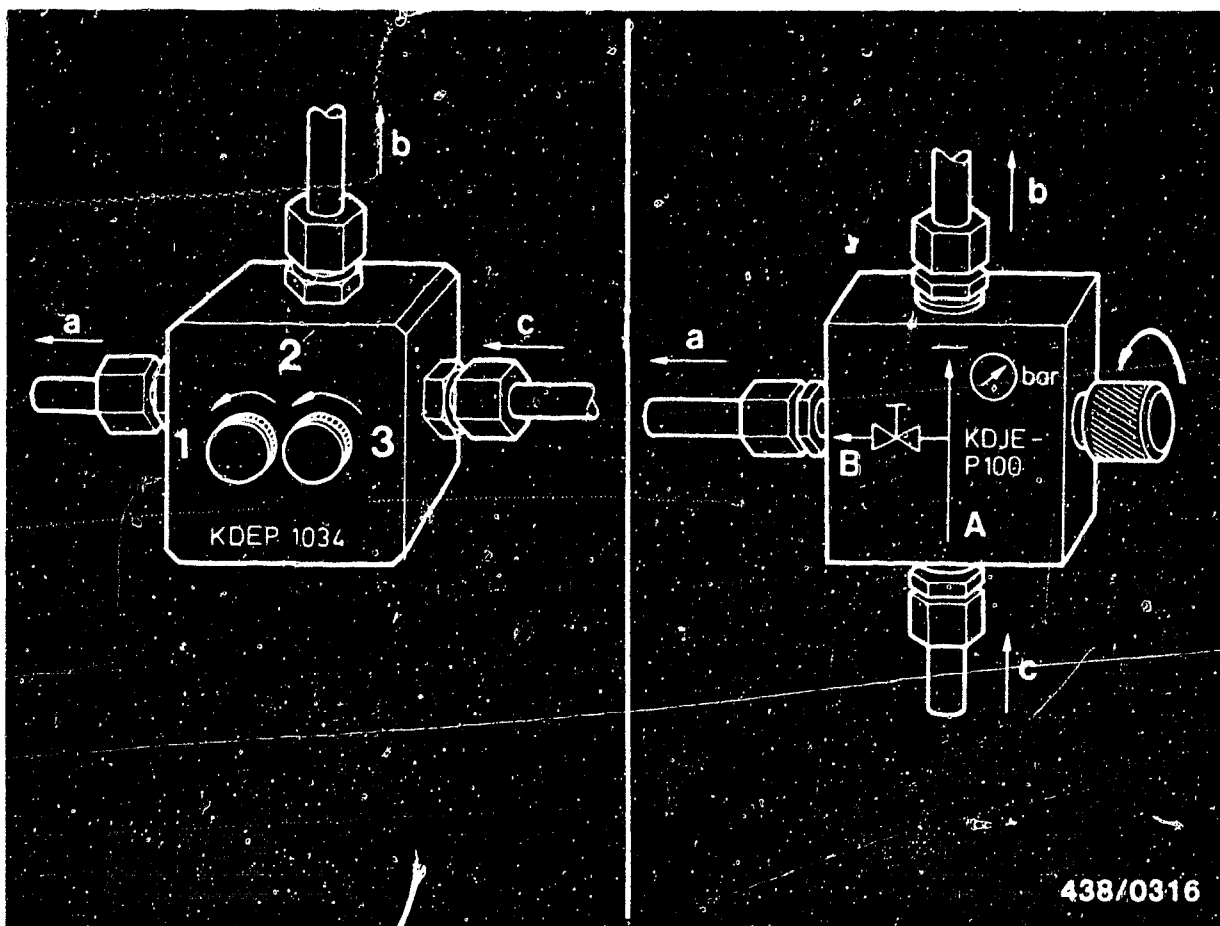
16.2 Bleeding the pressure tester

Disconnect the electric plug from the warm-up regulator and the auxiliary-air valve.

Let the pressure gauge hang down (hose fully extended). Switch on the electric fuel pump by bridging the electrical safety circuit.

Open and close the valve screw(s) of the directional-control valve in a 10-second rhythm about 5 times. Then hang the pressure gauge from a suitable support (e.g. from one of the struts under the engine hood). Open valve screw of directional-control valve (both screws in the case of KDEP 1034) (turning to the left).





a = To warm-up regulator
 b = To pressure gauge
 c = From fuel distributor

16.3 Leak test:

The test is performed with the engine switched off. Make the test with a warm engine but not immediately after the engine has been operated at a high temperature.

Open the valve screw of the directional-control valve (both valves in the case of KDEP 1034). Switch on the electric fuel pump by bridging the electrical safety circuit until the warm-up regulator has ceased to operate ("warm" control pressure).

Switch the electric fuel pump off again and observe the drop in pressure on the pressure gauge.



Test specifications for leak test:

Minimum pressure with fuel accumulator
0 438 170 014 (1978 model):

after 10 minutes: 1.6 bar (1.7 kgf/cm²)
after 20 minutes: 1.4 bar (1.5 kgf/cm²)

Minimum pressure with fuel accumulator
0 438 170 010 (1979/1980 model):

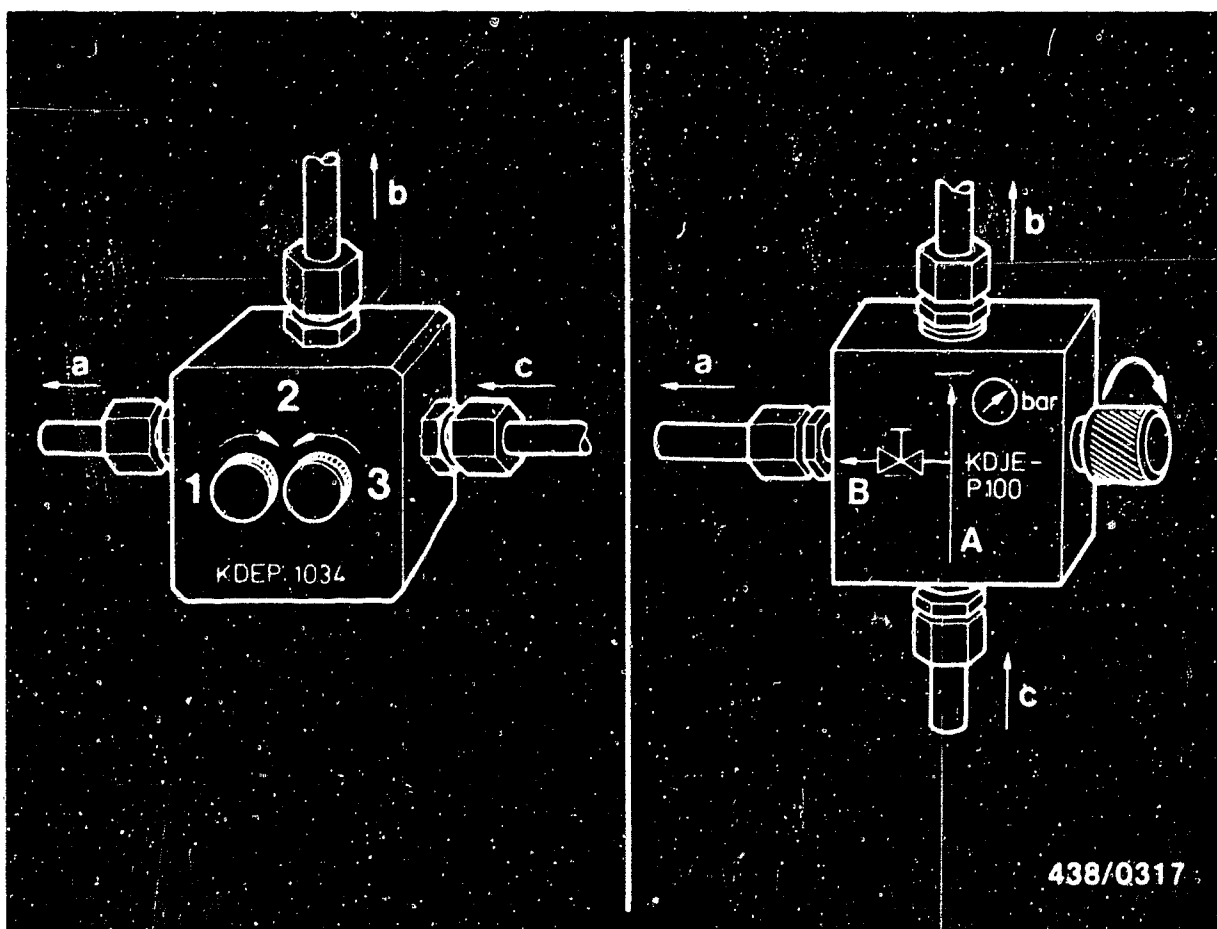
after 10 minutes: 2.0 bar (2.1 kgf/cm²)
after 20 minutes: 1.7 bar (1.8 kgf/cm²)

Minimum pressure with fuel accumulator
0 438 170 030 (as from 1981 model)
0 438 170 047 (as from 1.84)

after 10 minutes: 2.5 bar (2.6 kgf/cm²)
after 20 minutes: 2.4 bar (2.5 kgf/cm²)

Pressures in the test-specification table are given in bar (gauge pressure) and/or in kgf/cm² (gauge pressure).





If the pressure drops too quickly, repeat the test with the control-pressure circuit disconnected.

Position of the valve screws:

Close the valve screw of the directional-control valve KDJE-P 100. In the case of KDEP 1034, close valve screw 1, open valve screw 2.

If the same result is found, the leak is in the primary-pressure circuit. If the test results are correct during the second test, the leak is in the control-pressure circuit.

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Leak test on fuel system

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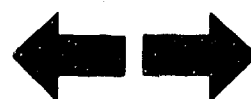
16.4 Possible causes of a defect in the primary-pressure circuit:

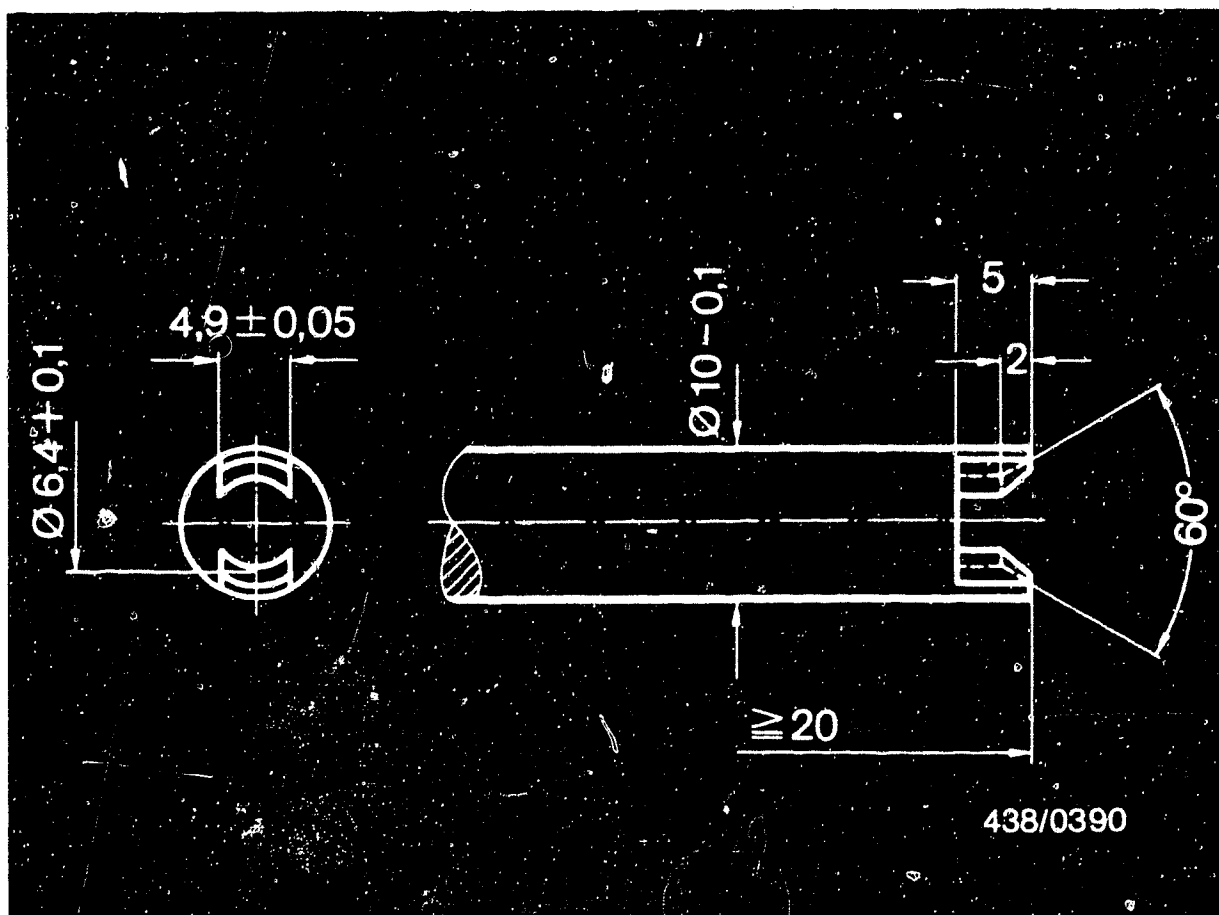
- Non-return valve in the pressure connection piece of the electric fuel pump has a leak.

The non-return valve is screwed into the pressure connection piece and can be replaced without removing the electric fuel pump.

Part number of the complete non-return valve:
1 587 410 901.

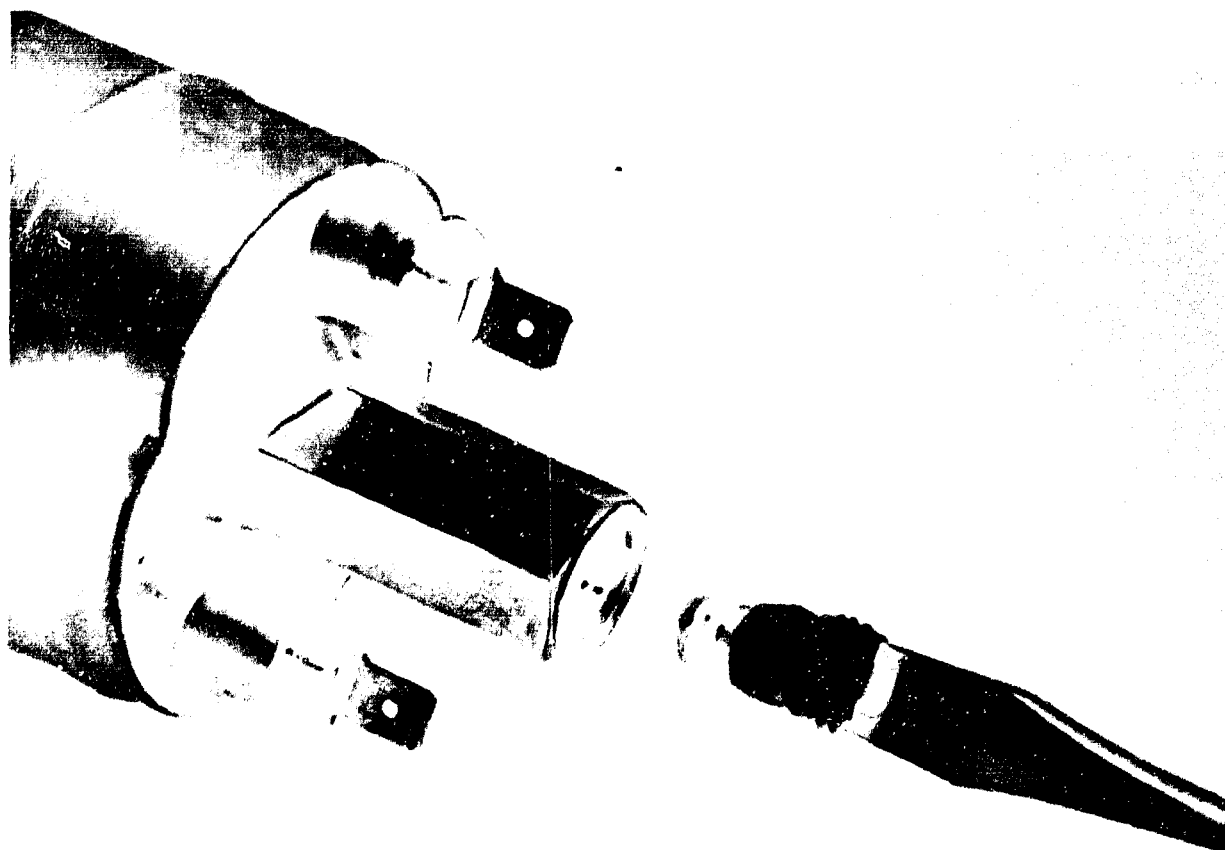
Remove the luggage-compartment floor board and remove the round cover plate underneath. Unscrew the fuel line from the electric fuel pump.





A special screwdriver is required for removing and installing the non-return valve. Such a screwdriver can be made in accordance with the above sketch.

Unscrew the non-return valve from the pressure connection piece.



438/0684

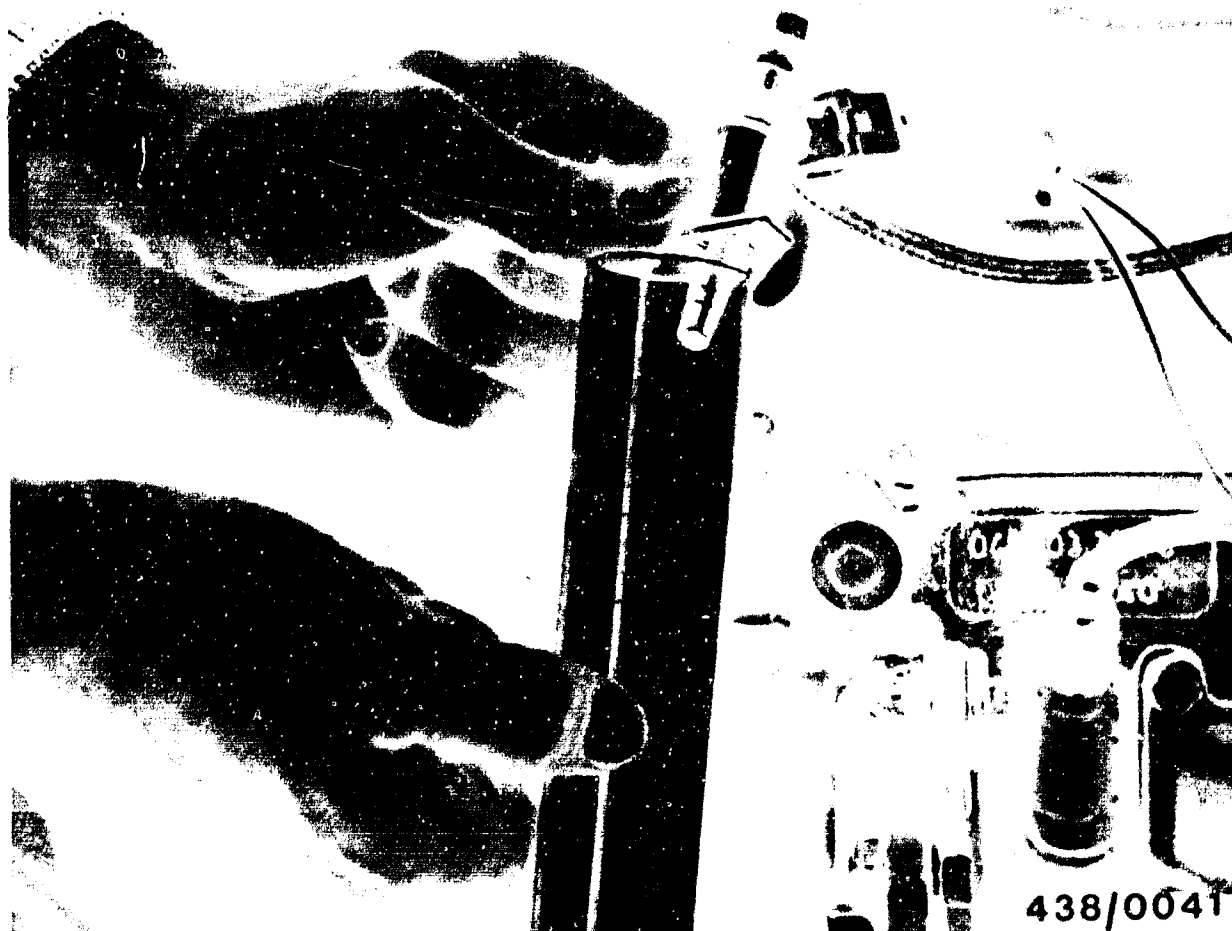
Screw the new non-return valve into the pressure connection piece of the electric fuel pump. Do not over-tighten. Do not exceed a tightening torque of 0.4...0.6 Nm (4...6 kgfcm).

D20

Leak test on fuel system

Saab 99/900





- The cold-start valve has a leak.

Remove cold-start valve. Hose line remains connected.

Hold start valve in a suitable container (e.g. graduate).
Switch on the electric fuel pump by bridging the
electrical safety circuit.

Dry off the nozzle of the cold-start valve.

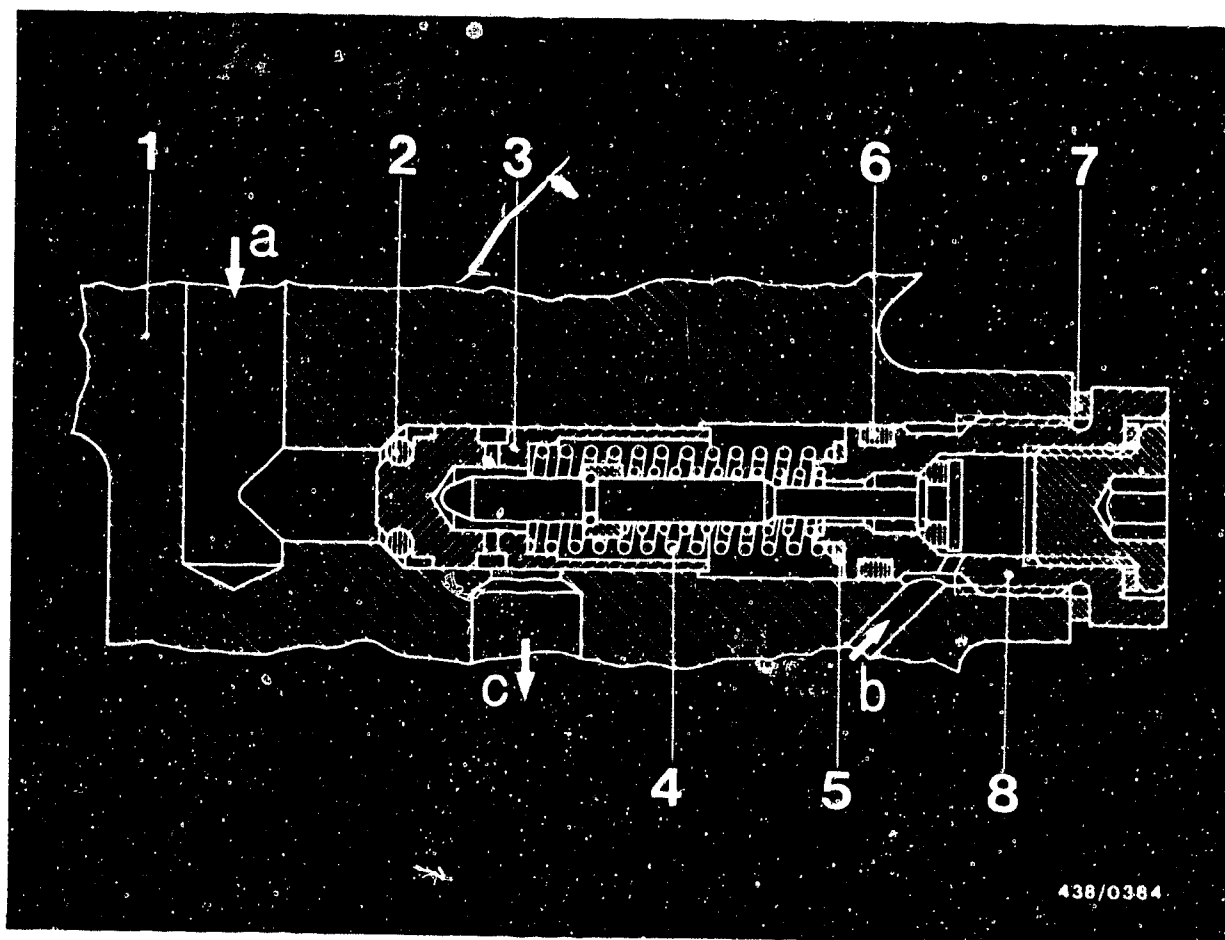
No drops must fall from the nozzle of the start valve
within the next minute. Even when shaken and knocked,
the start valve must not leak.

Switch the electric fuel pump off again.

Replace the cold-start valve, if leaky.

Finally, adjust the idle speed with the engine at normal
operating temperature. See Coordinates F 3.





- Seal ring on control piston of primary pressure regulator has a leak.

Replace seal ring:

Clean the fuel distributor in the region of the primary-pressure regulator.

Screw out the large screw plug (8) with the complete push valve. Also remove shims (5), control spring (4) and control piston (3).

Change O-ring (Item 2), fit control piston and control spring. Screw in screw plug (8) with complete push valve and with shims (as when removed) and new seal rings (6 and 7).



Finally, check the primary pressure and, if necessary, adjust by changing the shims.

Primary pressure, test specifications and settings
(gauge pressure)

Part No. of fuel distributor: 0 438 100 023

Checking value: 4.5...5.2 bar (4.6...5.3 kgf/cm²)

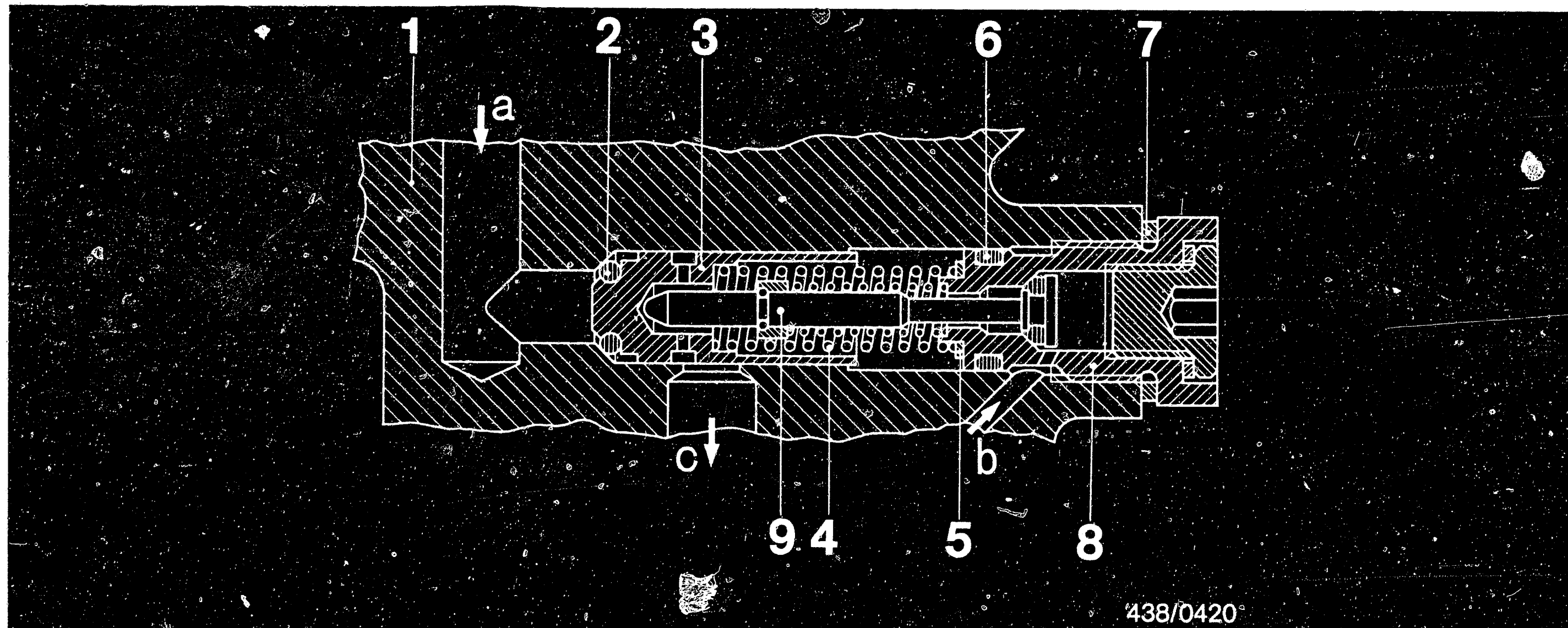
Setting value : 4.7...4.9 bar (4.8...5.0 kgf/cm²)

E1

Leak test on fuel system

Saab 99, 900





a = Primary pressure
b = from warm-up regulator
c = Fuel return

1 = Fuel-distributor housing
2 = O-ring
3 = Control piston

4 = Control spring
5 = Shims
6 = O-ring

7 = Flat seal ring
8 = Screw plug
9 = Push valve

16.5 Possible causes of a defect in the control-pressure circuit:

• The push valve (9) in the primary-pressure regulator has a leak. Since the seal ring of the push valve is rigidly vulcanized onto the valve needle, the whole push valve (ready-assembled unit) must be changed. Clean the fuel distributor in the region of the primary-pressure regulator. Unscrew the large screw plug (8) with the complete push valve. Pay attention to control spring (4) and shims (5). Screw in new push valve with the previously used number of shims (5), a new O-ring (6) and a flat seal ring (7). Then check the primary pressure once again, correcting if necessary.

E2

Leak test on fuel system
Saab 99/900



E3

Leak test on fuel system
Saab 99/900



Primary pressure, test specifications and settings
(gauge pressure)

Part No. of fuel distributor: 0 438 100 023

Checking value: 4.5...5.2 bar (4.6...5.3 kgf/cm²)

Setting value : 4.7...4.9 bar (4.8...5.0 kgf/cm²)

E4

Leak test on fuel system

Saab 99, 900



17. Testing the injection valves

Remove the injection valves for testing. To do this, unscrew the two brackets (each holding 2 injection valves). When loosening the fuel lines, apply counterforce at the fixed hexagon of the injection valves.

Before refitting the injection valves check the seals on the valve stem to see whether they are deformed or damaged. If need be, use new seals (Saab service parts) in order to prevent leaks and thus the entry of unmetered air.

17.1 Test equipment and test media:

The following testing specification refers to valve testers KDJE-P 400 (previously KDEP 7452) and 0 681 200 700.

Observe the test-media specification!

Test media: Calibrating fluid (Shell K 30, Esso-Varsol, Shell Mineral Spirits 135)

or

Bosch Part No. VS 14 942-CH

Former Part No. 5 973 340 650

The calibrating fluid can be obtained in 5 l metal cans from the following supplier:

Firma

Oskar Gnamm GmbH & Co

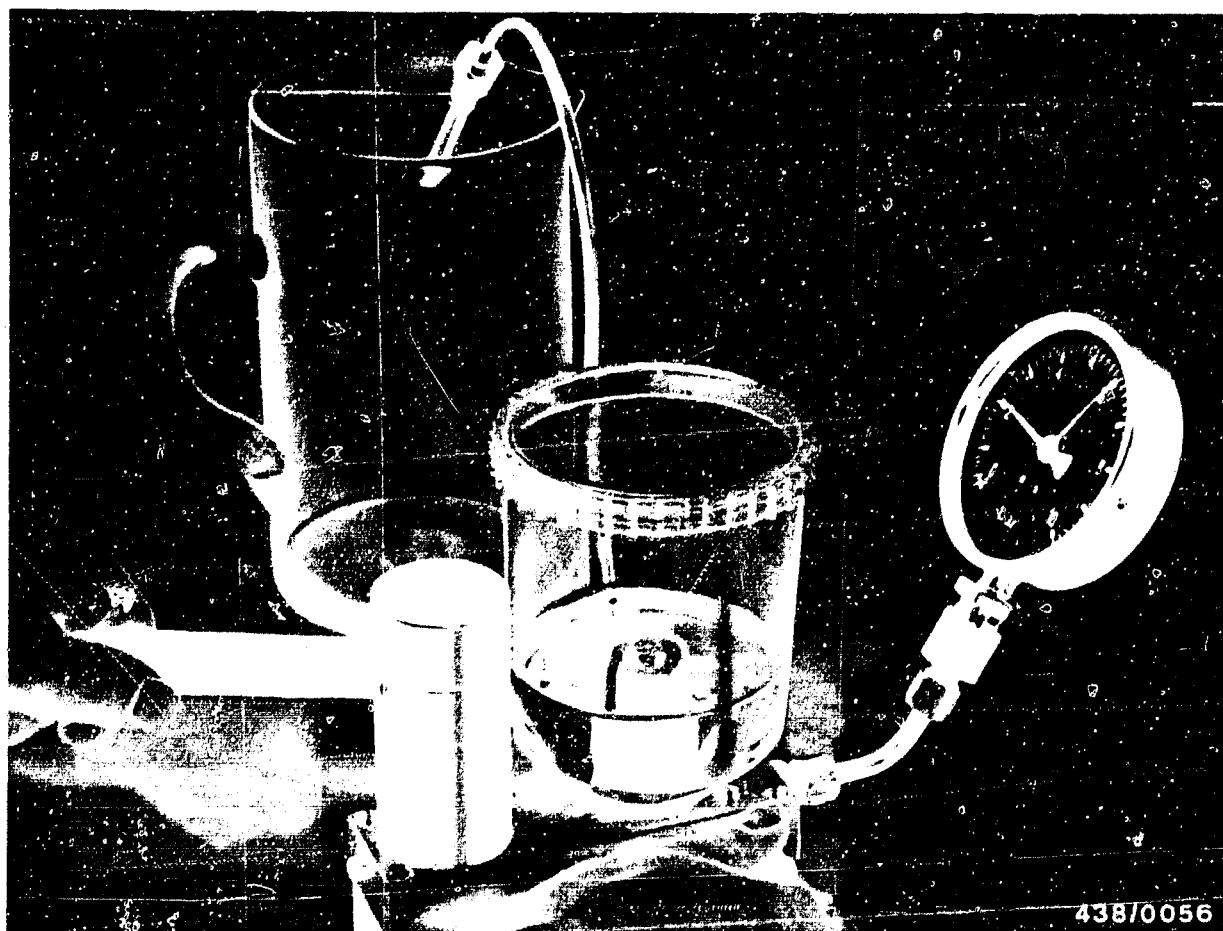
D-7531 Kämpelbach-Bilfingen

Caution:

For safety reasons, never use normal gasoline or similar easily inflammable and combustible liquids.

Even with calibrating fluid, be sure to observe the local official regulations.





438/0056

17.2 Connecting the injection valve to the tester

Connect injection valve to valve tester and bleed the discharge tubing by moving the lever back and forth several times with the union nut open. Then tighten the union nut.

17.3 Checking for dirt

Move the hand lever slowly (about 2 seconds per stroke) back and forth with the stopcock on the pressure gauge open. If the pressure does not build up to 1...1.5 bar gauge pressure, the injection valve has a bad leak (caused, for example, by dirt stuck in it).

You can try to flush the injection valve clear by moving the lever back and forth several times strongly.

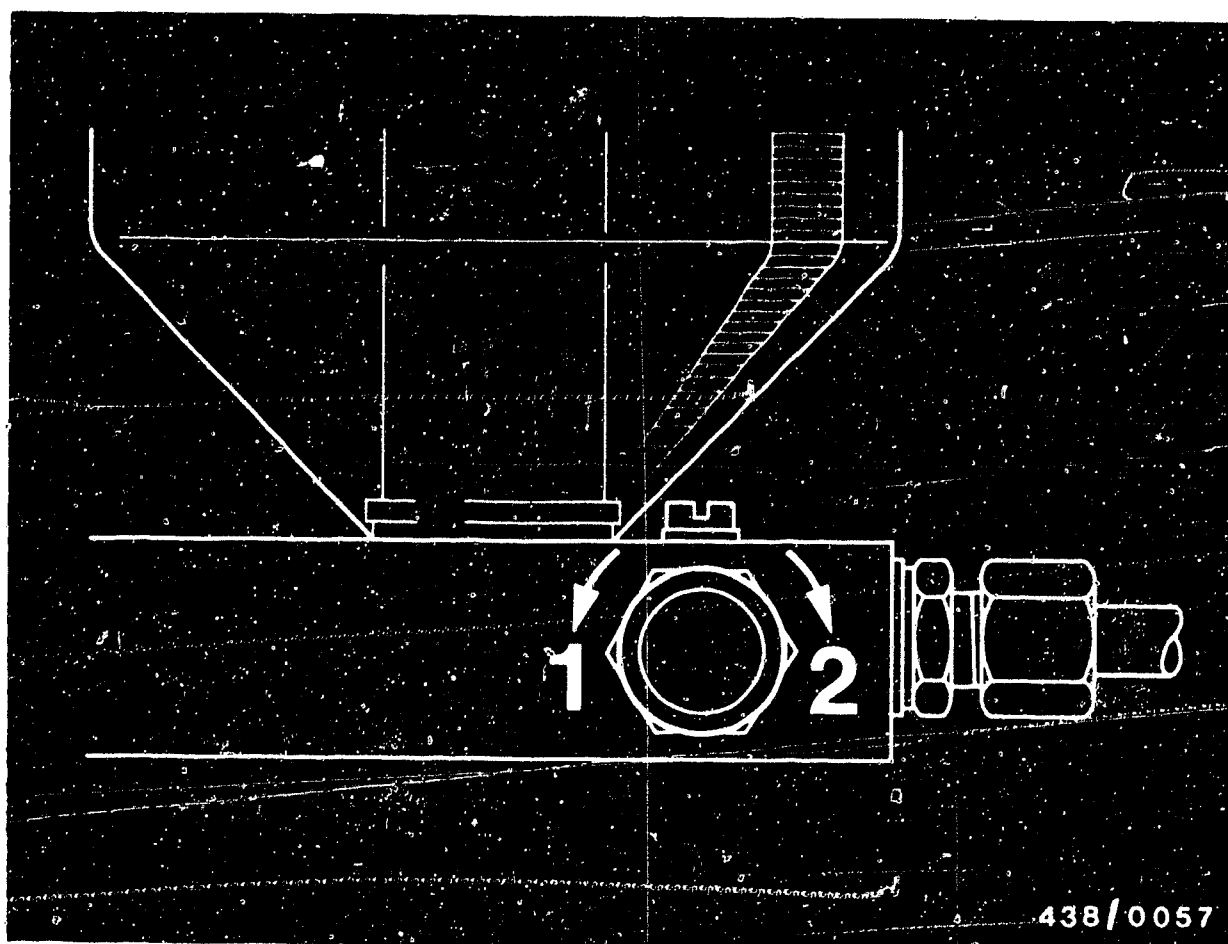
If this attempt is successful continue the test. If it is not possible to flush the valve clear, replace it.

E6

Testing the injection valves

Saab 99, 900





1 = Open

2 = Close

17.4 Testing the opening pressure

Test specifications - opening pressure:

Part No. 0 437 502 004 up to FD 828 (1978 model)

Opening pressure: 2.5...3.6 bar (2.6...3.7 kgf/cm²)

Part No. 0 437 502 004 from FD 829 (1979 model)

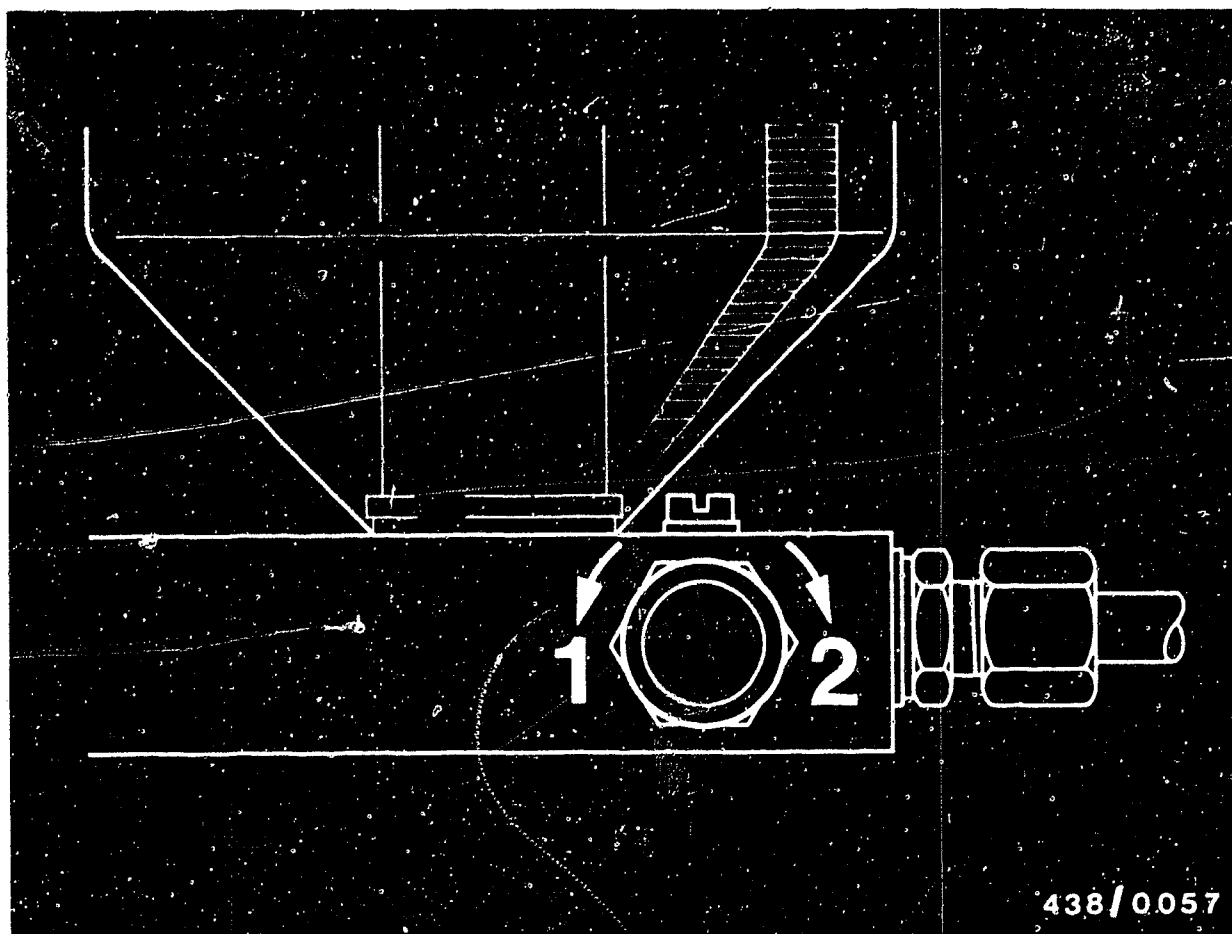
Opening pressure: 2.7...3.8 bar (2.8...3.9 kgf/cm²)

Part No. 0 437 502 012 (from 1980 model)

Opening pressure: 3.0...4.1 bar (3.1...4.2 kgf/cm²)

Pressures in the test-specification table are given in bar (gauge pressure) and in kgf/cm² (gauge pressure)





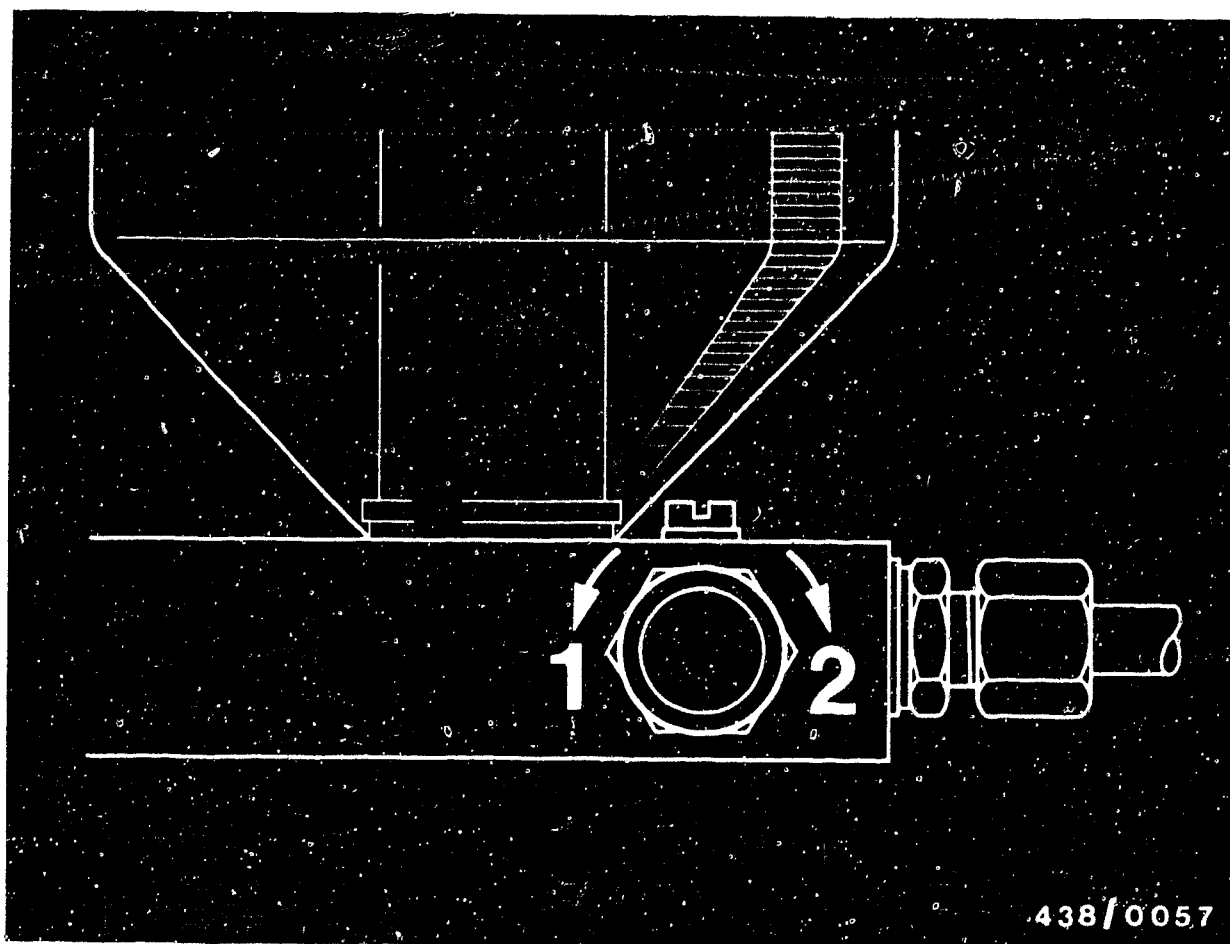
1 = Open

2 = Close

With the stopcock closed, flush the valve out and bleed it with several rapid movements of the lever.

Open the stopcock and test the opening pressure by moving the lever slowly (about 2 seconds per stroke). If the opening pressure is outside tolerance, replace the injection valve. Individual valves can also be interchanged within a set.





1 = Open

2 = Close

17.5 Leakage test

Open the stopcock, build the pressure up slowly to a value 0.5 bar under the opening pressure determined previously (but not less than 2.3 bar gauge pressure), and hold it constant at that level. No drops must now fall from the valve for the next 15 seconds.

E9

Testing the injection valves

Saab 99, 900





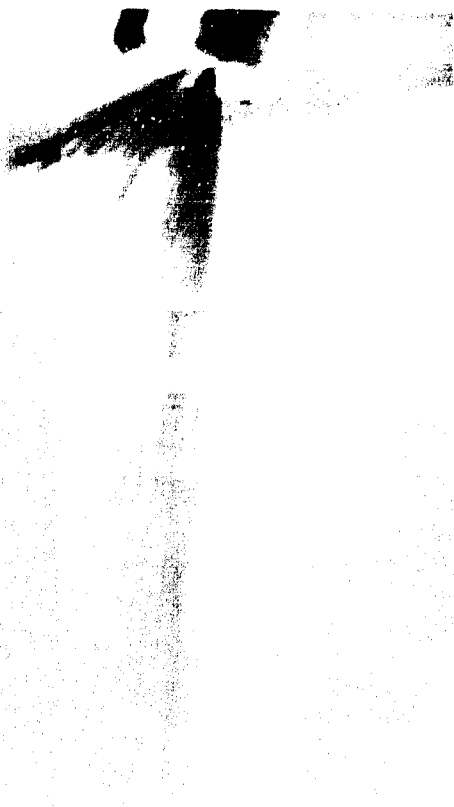
438/0058

17.6 Chatter test, evaluation of spray

Move the lever back and forth at about 1 stroke per second. As this is done, the valve must chatter. No drops of fuel must form at the mouth of the valve. The valve must not produce a "cord spray". Formation of a single-sided, atomized spray within an overall spray angle of about 35° is permissible (see example given in illustrations).

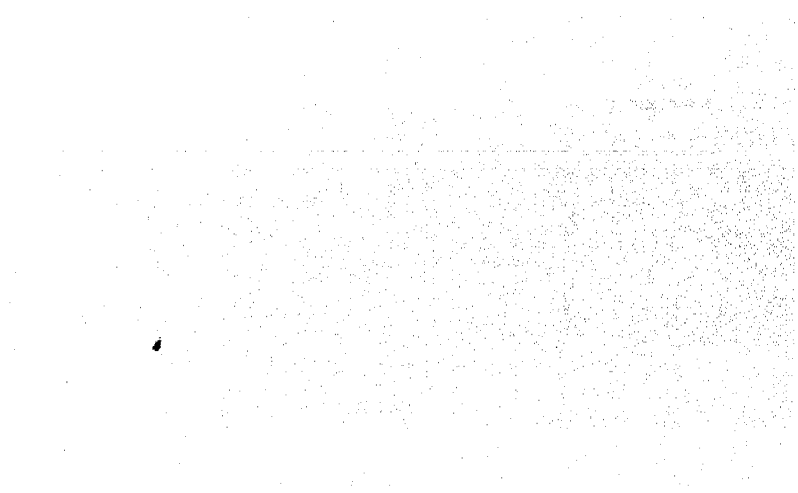
Illustration shows good spray formation.





438/0059

Illustration shows single-sided but nevertheless good spray formation.



E11

Testing the injection valves
Saab 99, 900





438/0060

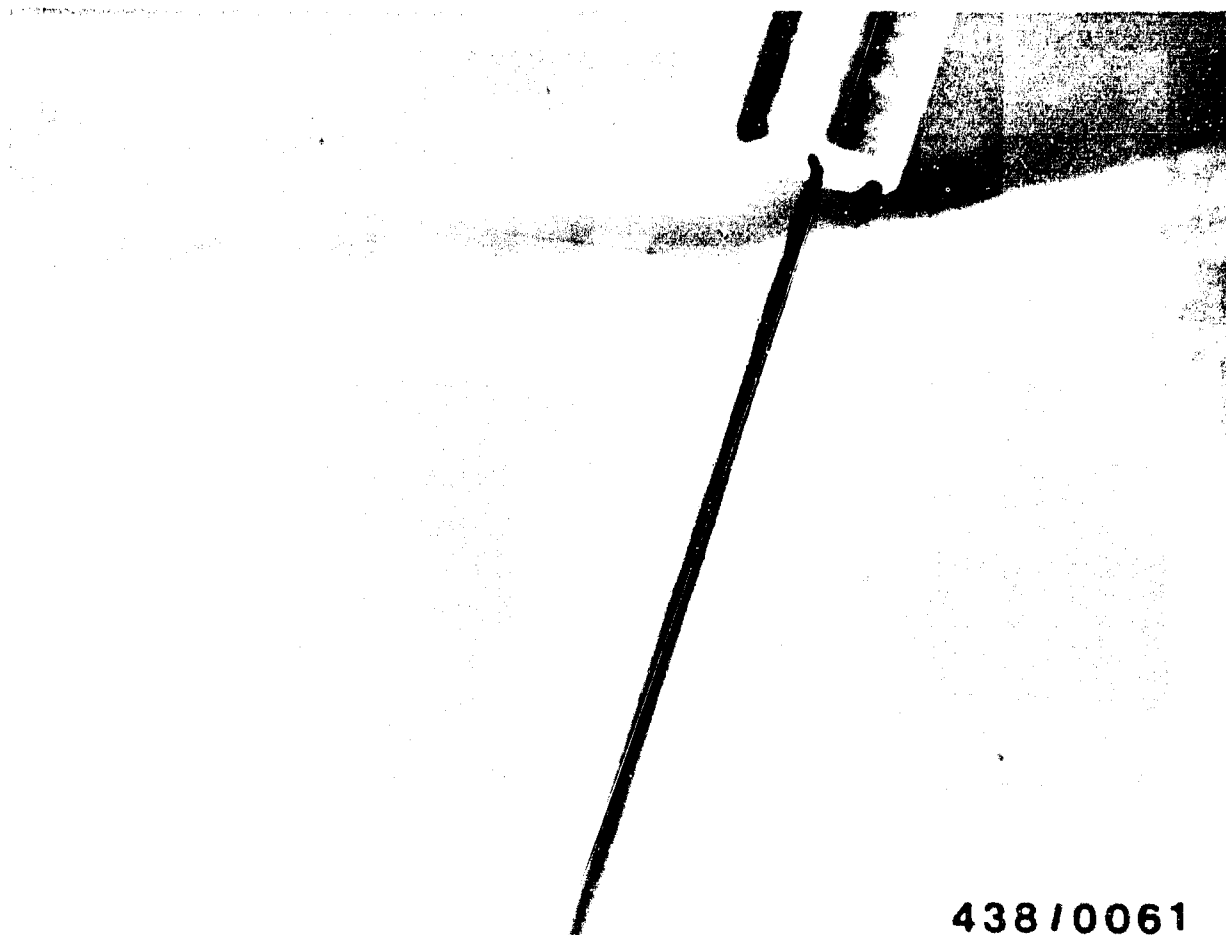
Poor spray formation; replace injection valves.

Illustration shows drop formation.

E12

Testing the injection valves
Saab 99, 900





438/0061

Poor spray formation; replace injection valves

Illustration shows "cord spray".

E13

Testing the injection valves

Saab 99, 900





438/0062

Poor spray formation; replace injection valves.

Illustration shows "spray in strands".

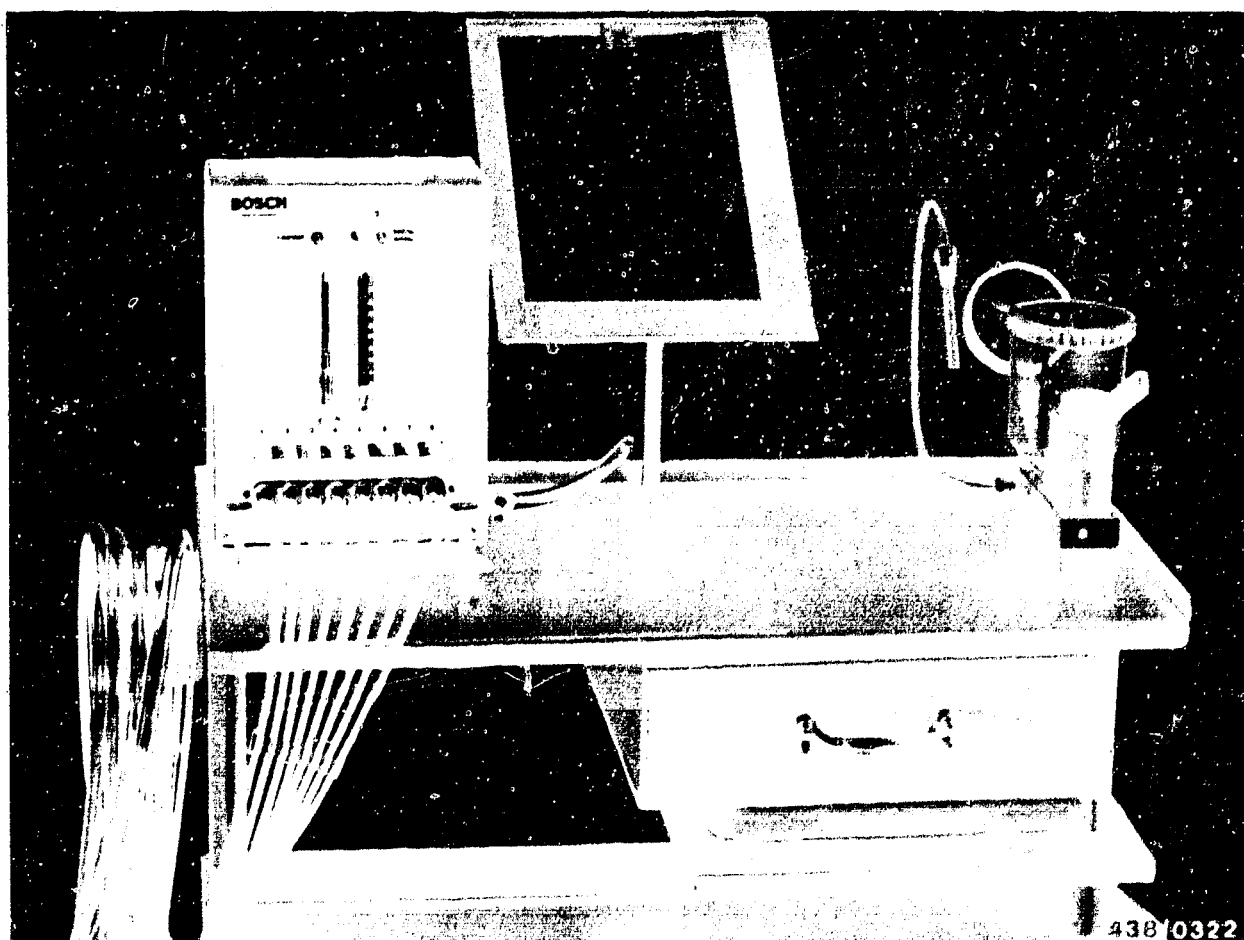
If defective injection valves have been replaced, it is necessary finally to adjust the idle speed with the engine at normal operating temperature.

Idle-speed adjustment is described on Coordinates F 3.

E14

Testing the injection valves
Saab 99, 900





18. Comparative measurement of fuel delivery of fuel distributor outlets.

This test is carried out using the tester for delivered quantity comparison KDJE-P 200 (previously KDJE 7451).

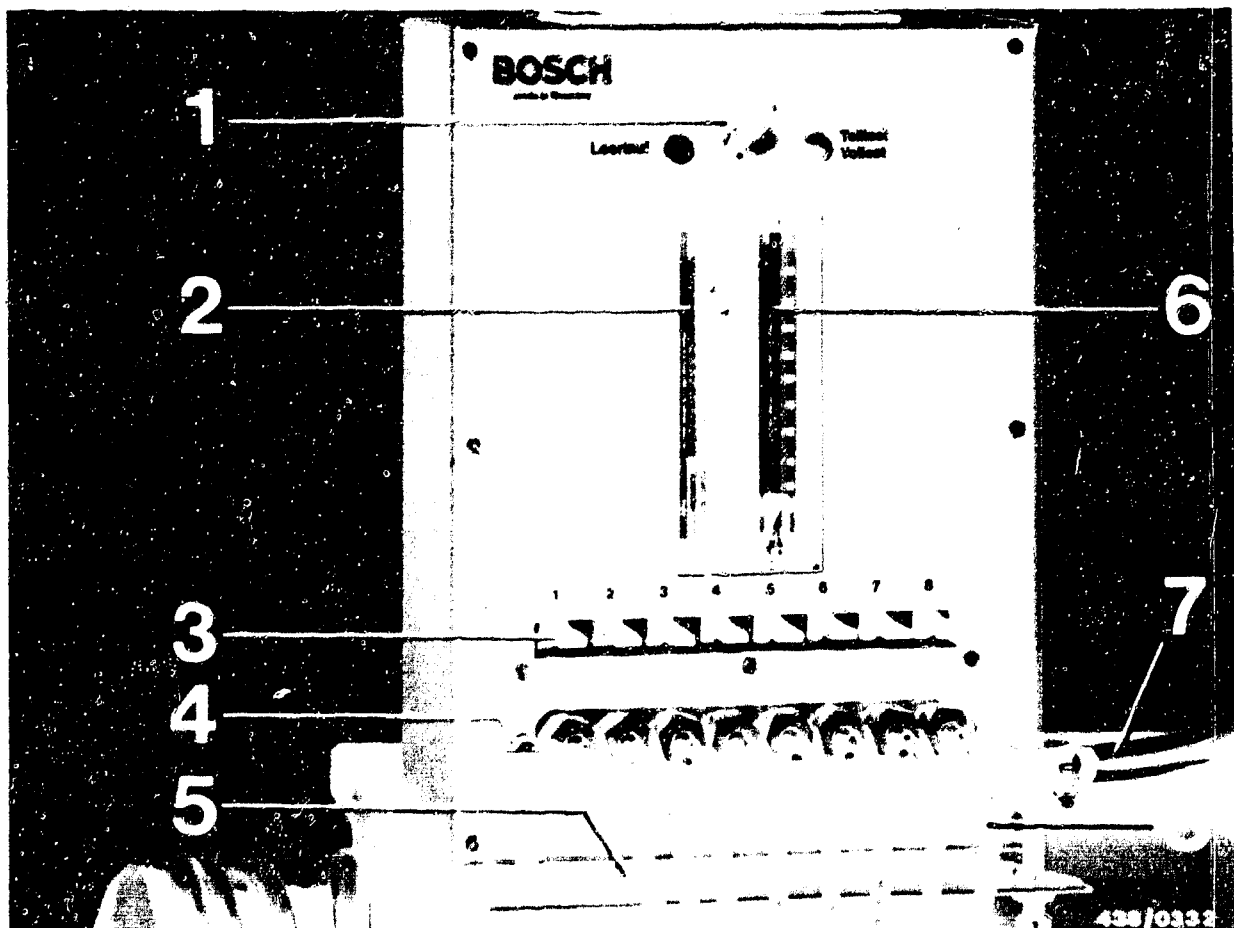
18.1 Application

By means of comparative measurements, the differences in the amounts of fuel delivered from the individual outlets on the fuel distributor are determined.

The tester is designed so that the test can be made on the vehicle without having to remove the fuel distributor.

Since the test is made with the original injection valves, the operator can recognize at the same time whether delivered-quantity scatter, if it occurs, is caused by the fuel distributor or by the injection valves.





- 1 = 3-way cock
- 2 = Small rotameter tube
- 3 = Keyboard for 8-way valve
- 4 = Adjusting screw for setting up
- 5 = Spirit level
- 6 = Large rotameter tube
- 7 = Return hose
- 8 = Polyamide hose lines (test lines)

18.2 Construction

The tester is designed for use with all engines, up to 8 cylinders, equipped with K-Jetronic.

E16

Comparative measurement of fuel delivery
Saab 99, 900



Basically, the tester consists of a steel housing containing 2 rotameter tubes with measuring ranges of 2...15 cm³ and 10...180 cm³, an 8-way valve for key operation (3) and a 3-way stopcock (1).

The small rotameter tube (2) is used for the idle measurement while the large tube (6) is used to measure the fuel delivery at part- and full-load.

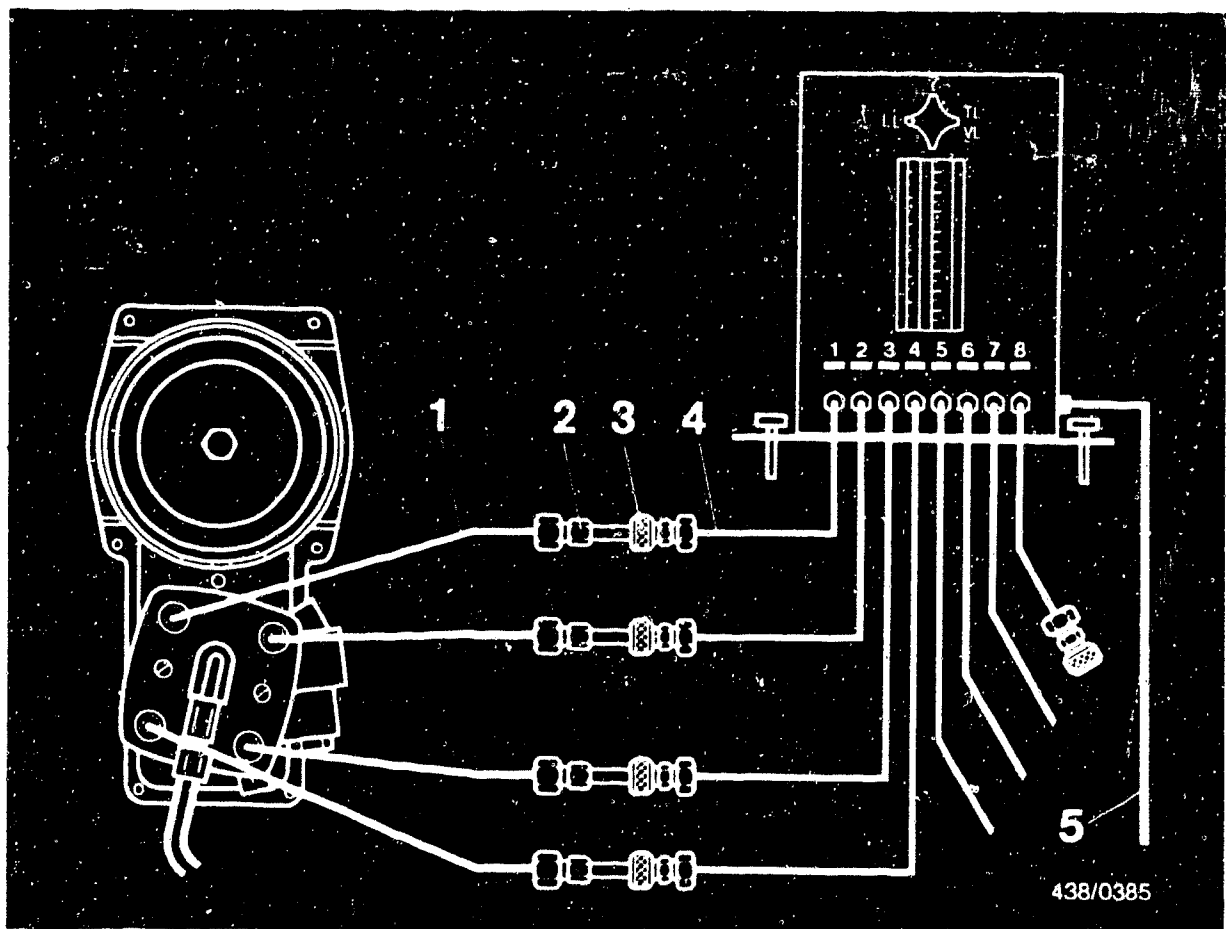
The particular rotameter tube to be used is connected by means of the 3-way stopcock. Using the 8-way valve, the fuel delivery of each cylinder is tested one after the other.

Attached to the tester are 8 hoses (8), each terminated with an automatic connector. When the injection valves are withdrawn from their sockets on the engine they are attached to these connectors. Each automatic connector is fitted with a push valve so that no fuel can escape from connectors that are not in use (when 4- or 6-cylinder systems are tested).

The fuel is returned to the fuel tank through a hose (7) about 5 m long.

The entire test is made with a closed circuit, i.e. no fuel escapes.





- 1 = Fuel-injection tubing of fuel distributor
- 2 = Injection valves
- 3 = Automatic connectors
- 4 = Tester hoses
- 5 = Return line to fuel tank filler neck

18.3 Setting up and connecting the tester:

Set the tester up beside the vehicle on a solid base (e.g. on tester trolley KDJE-W 100) and align it with the built-in spirit level (water level at base of the tester).

Remove injection valves; the injection tubing remains connected. To do this, unscrew the two brackets (each holding 2 injection valves) and pull the injection valves out of their bores.

Before refitting the injection valves check the seals on the valve stem to see whether they are deformed or damaged. If need be, use new seals (Saab service parts) in order to prevent leaks and thus the entry of unmetered air.

Clean the injection valves with a rag and insert injection valves in correct sequence into the automatic connectors of the first four tester hoses.

Note:

Insert the injections valves as far as they will go and tighten the knurled thumbscrews well so that the non-return valves of the automatic connectors are open fully. Introduce the return hose of the tester into the fuel tank filler neck.

18.4 Bleeding the tester:

Remove the rubber hood so that air-flow sensor plate becomes accessible.

Remove the electric plugs from the warm-up regulator and the auxiliary-air device.

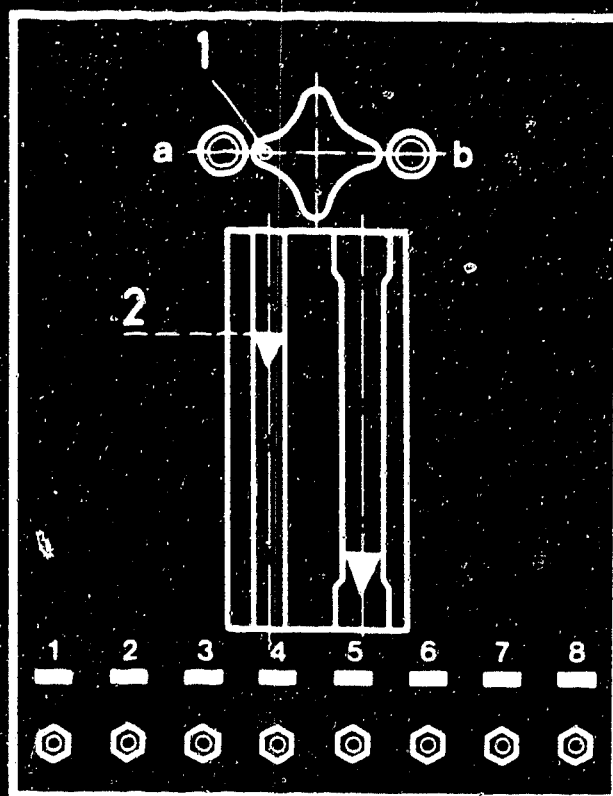
Switch on the electric fuel pump by bridging the electrical safety circuit.

Raise the air-flow sensor plate to the stop.

Press the keys on the 8-way valve one after the other, while simultaneously switching the 3-way stopcock until both rotameter tubes are bled.

Return the sensor plate to the rest position.





438/0325

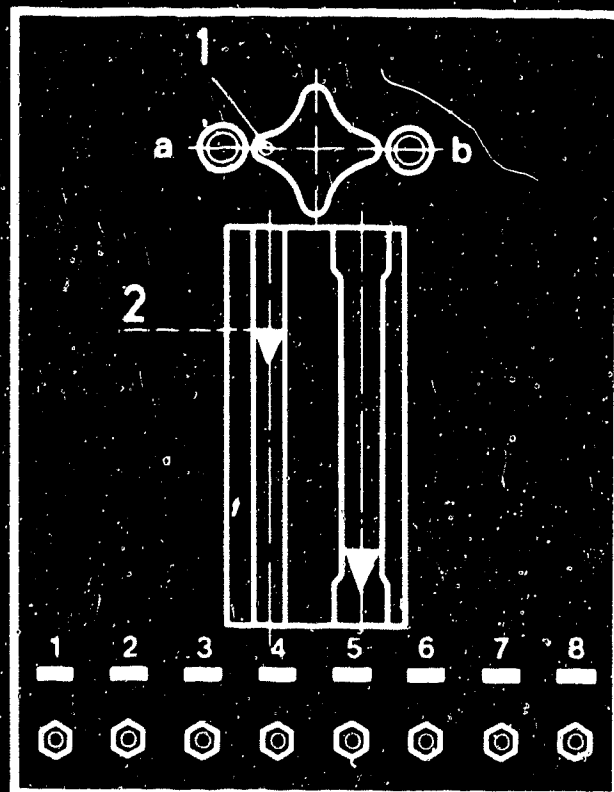
1 = White dot
2 = Measuring line

a = Idle
b = Part load/full load

18.5 Testing

The flow comparison measurement is made in the idle, part-load and full-load ranges.

The small rotameter tube is to be used for the idle measurement (white dot to the left on control knob); part-load and full-load measurements are made using the large rotameter tube (white dot to the right).



438/0325

1 = White dot

2 = Measuring line

a = Idle

b = Part load/full load

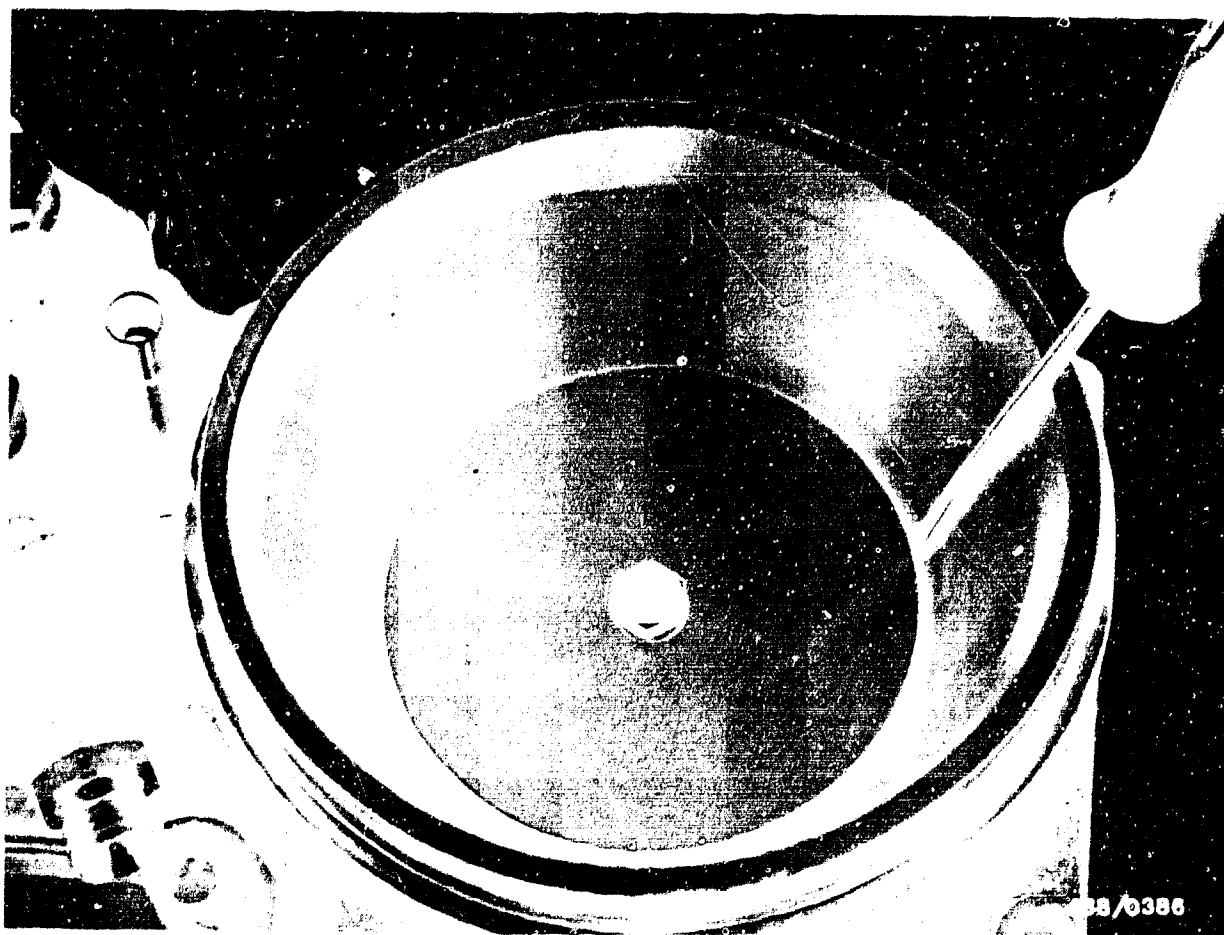
The delivered quantities indicated on the rotameter tubes are read off at the top edge of the conical float (Item 2). On testers with a ball float the uppermost point of the ball is used for reading off. With each measurement be sure to wait until the float has reached its final position. This may take 20...30 seconds in the case of small deliveries.

E21

Comparative measurement of fuel delivery

Saab 99, 900





The exact setting and locating of the position of the air-flow sensor plate for the various load ranges is done using a screwdriver (a small one for the idle-position), which is inserted to an appropriate depth between the air funnel and air-flow sensor plate.

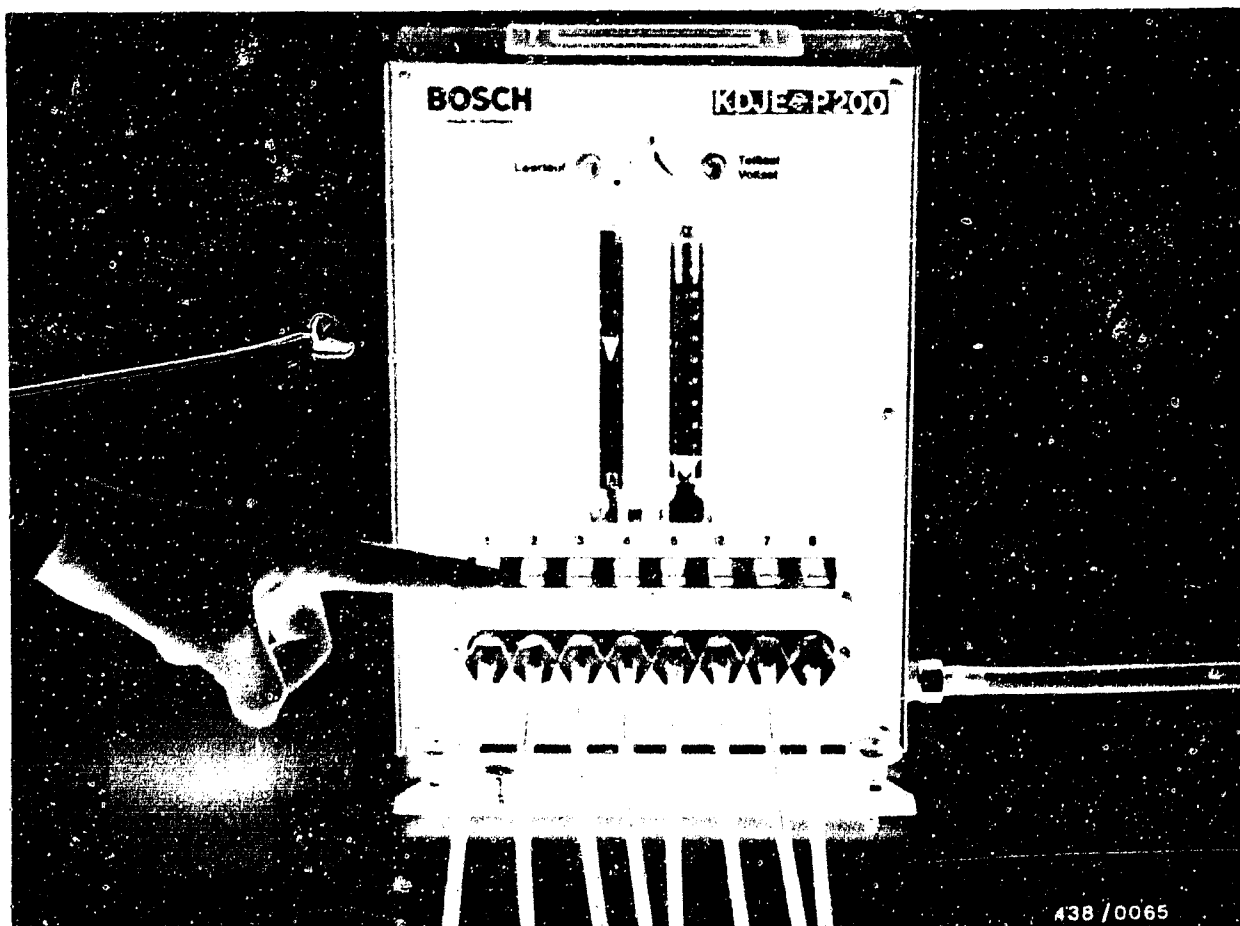
Procedure:

Switch on the electric fuel pump by bridging the electrical safety circuit.

Fixed numerical values are specified in the following test section for the maximum permissible fuel delivery differences for the individual load ranges.

The "set point" value always pertains to the fuel-distributor outlet with the lowest fuel delivery, i.e. in each case the outlet with the lowest delivery is to be first ascertained.





438 / 0065

Press the key for outlet 1. Pivot the air-flow sensor plate until the corresponding rotameter tube approximately indicates the "set point" value. Fix the air-flow sensor plate in this position.

Test the remaining outlets in order to determine which outlet has the lowest fuel delivery.

Press the key for this outlet again, and set the delivery precisely to the "set point" by correcting the position of the air-flow sensor plate. Then fix the air-flow sensor plate in this position again.

Press the remaining keys one after the other, and determine the maximum fuel delivery of each outlet. A deviation in fuel delivery can only be above the "set point".

F1

Comparative measurement of fuel delivery
Saab 99, 900



18.6 Test Specifications

Fuel distributor Part No. 0 438 100 023	Set point (cm ³ /min)	Max. permissible fuel delivery (cm ³ /min)
Idle	6.0	6.8
Part load	40.0	44.0
Full load	160.0	176.0

If, in testing, too large a difference is ascertained in one of the three load ranges, the test should for safety's sake be repeated.

If the result is confirmed, you should check whether the fault lies in the fuel distributor or in the injection valves.

To do this interchange the injection valves with the greatest and smallest difference.

If the result is still the same, the fault is in the fuel distributor. If the fault follows the interchanged injection valves, it lies in the injection valves.

Change defective fuel distributor and/or replace defective injection valves.

18.7 Final operations

Re-fit the injection valves properly. Also fit the air filter. Make sure that all lines are laid correctly.

Re-connect the electrical safety circuit of the K-Jetronic properly.

Use a trial run to check that there are no leaks in line connections. Finally check the idle-speed adjustment; if necessary, correct (Coordinates F 3).



19. Idle adjustment

19.1 Test conditions

Warm up the engine for the idle adjustment (oil temperature approx. 80°C).

Important:

If the fuel-injection lines or injection valves have been loosened or removed, warm up the engine under load. The low fuel throughput at idle is not always sufficient for bleeding the fuel-injection lines.

The idle adjustment must not be performed with the engine too hot, i.e. immediately after being raced or after a power measurement on the roller-type test stand.

In vehicles with an air conditioner, this should be switched off to stabilize the engine speed during idle-speed adjustment. Rotational-speed measurement with separate tachometer.

Check that the throttle-plate lever makes contact with the idle stop. The cable should be free of tension.

Switch on upper beam during the idle adjustment.

19.2 Test specifications for idle adjustment:

Idle speed:

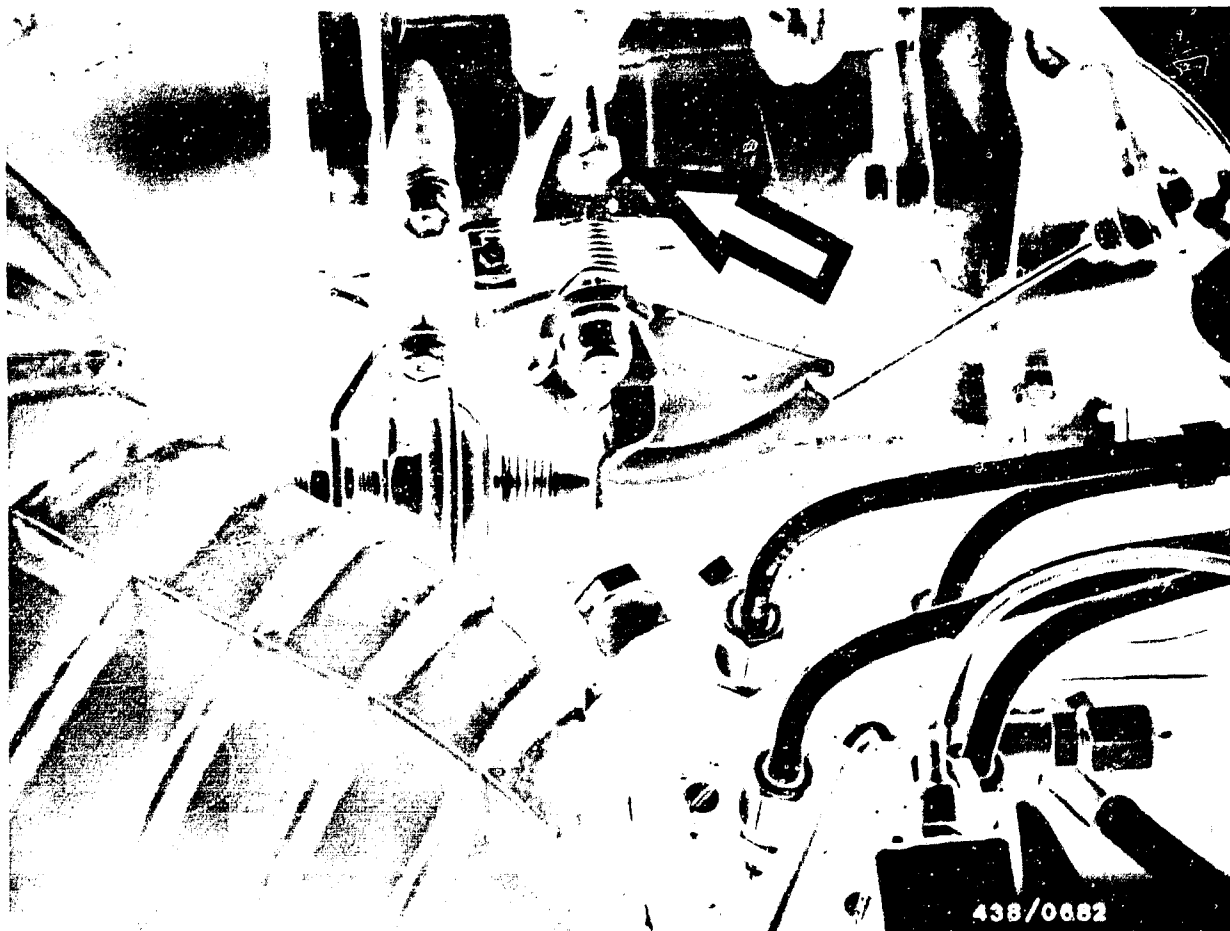
All versions: 825...925 min⁻¹

CO concentration (% by vol.):

European version in general: 0.5...2.5

Sweden version: 1.0...2.0



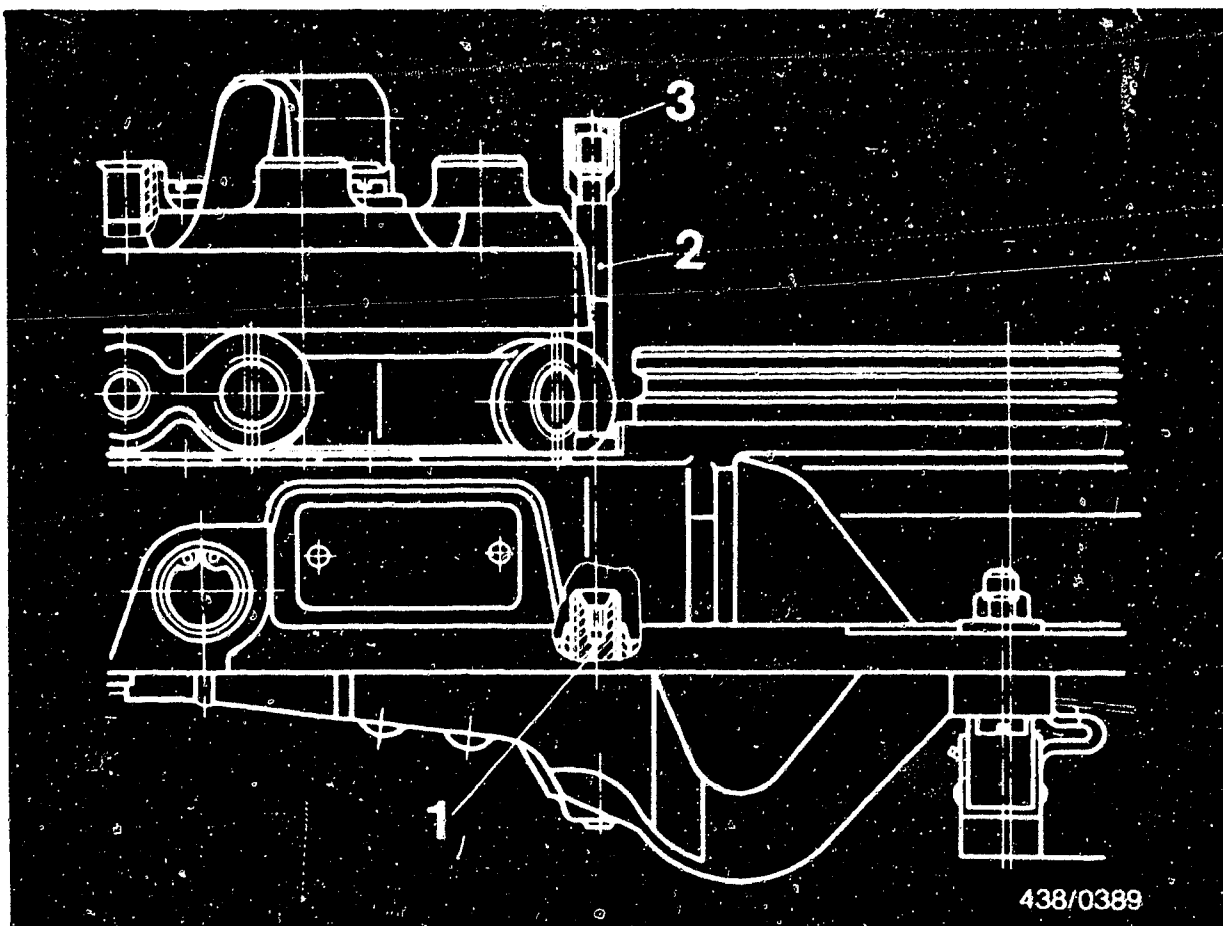


Adjust the idle speed at the bypass screw (arrow) on the throttle-valve assembly. After adjusting, tighten the lock nut securely.

F4

Idle adjustment
Saab 99/900





Adjusting the CO concentration

The CO concentration is adjusted by turning the idle-mixture-adjusting screw (1) in the mixture-control unit using the adjusting wrench KDEP 1035.

After removing the safety cap (3) of the guide tube (2), the adjusting wrench is passed through the guide tube and inserted into the idle-mixture-adjusting screw.

Turning to the right = richer mixture

Turning to the left = leaner mixture

F5

Idle-speed adjustment

Saab 99, 900



Caution: Always make the adjustment from the lean side, i.e. if the mixture is too rich turn the idle-mixture-adjusting screw further to the left than necessary and then turn it to the right up to the setting required.

After every adjustment remove the adjusting wrench and accelerate the engine briefly, so that the air-intake system can cool off. Then wait until the indicator of the CO tester has stabilized. Never accelerate the engine with the wrench still in place as this could result in bending the control lever in the air-flow sensor.

F6

Idle-speed adjustment

Saab 99, 900



19.3 Anti-tamper device for idle-mixture-adjusting screw:

In the Federal Republic of Germany, § 47 of the FMVSS/CUR, "Exhaust Gases and their Discharge", has been amended. This amendment order was printed in full in the Verkehrsblatt 13 of 15th July 1975.

Accordingly, all motor vehicles with externally supplied ignition produced as of 1 October 1976 must be provided with anti-tamper devices for the idle-mixture-adjusting screw so that it is not possible to adjust the screw without destroying the anti-tamper device. The intention is to prevent non-experts from re-adjusting the idle setting and thus inadmissibly influencing the exhaust gas. Consequently, the anti-tamper caps may only be used in the workshop and must not be sold to customers for their own use.

These anti-tamper caps come in different colors. The cap to be used for the after-sales service of updraft air-flow sensors is red.

It can be obtained from Bosch under part number 3 430 522 002.

The anti-tamper device for the air-flow sensor is removed and fitted using special tools (e.g. No. 131 090 from Cartool Co., Hans Schubert KG Unterer Grasweg 88, D-8070 Ingolstadt).

F7

Idle-speed adjustment
Saab 99, 900



After-sales Service

Technical Bulletin

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Packaging of goods under warranty

K-Jetronic (CIS)

438

VDT-I-438/101 B
10.1976

All components or assemblies of the K-Jetronic which are dispatched under warranty must be correctly and carefully packaged so that no further damage or impairments occur during transit, since these would not be covered by warranty.

Any fuel remnants must be removed from those K-Jetronic assemblies intended for dispatch, so as to eliminate any danger of fire during transit.

The intake openings and outlets of the assemblies must be sealed off with caps or plugs. As new products were fitted, the caps or plugs from these may be used.

The plunger of the fuel distributor is to be fitted with a protective cap of adequate size, or secured to the fuel distributor.

In addition, the assemblies are packed in tightly packed, well-sealed plastic sleeves. Fuel distributors and warm-up regulators are packed individually.

If components arrive damaged due to incorrect packaging or do not comply with these instructions, they can be returned and the warranty claim rejected.

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L1

Technical Bulletin

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After-sales Service

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Securing of idle-speed adjusting screws

K-Jetronic (CIS)

438

VDT-I-438/102 B
11.1976

According to a statutory regulation, changes have been made to § 47 of the German traffic licensing laws concerning exhaust gases and their outlets. This regulation was printed in full in traffic law sheet 13 of 15.7.75.

Consequently, all motor vehicles with external-ignition engines must have their idle-speed adjusting devices secured from the 1st October 1976, so that adjustment of the screw is impossible without destroying the securing device. This should stop unskilled people from adjusting the installation of the idle-speed system and thereby illegally influencing the emission values. As from now, securing caps can only be used in the workshop and cannot be sold to customers for their own use.

Securing caps are produced in various colors. For after-sales service the following caps and colors are used:

downdraft air-flow sensor

Blue

securing cap is not available from BOSCH.
Part number is DB 000.997.59 86 from the
Deutsche Vergaser Gesellschaft K 34 520

updraft air-flow sensor

Red

Part number 3 430 522 002

These stipulations are only valid in countries where ECE regulations (Economic Commission for Europe) apply. The air-flow sensors must however be converted for the use of these securing caps, as a matter of principle. The caps can also be used in countries not subject to ECE regulations, to prevent dirt penetrating through the pipe to the adjustment in the case of updraft air-flow sensors.

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After-sales Service

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FUEL PUMPS 0 580 254 9..

with replaceable non-return valve

58

VDT-I-580/100 En

9.1978

On various new-model fuel pumps 0 580 254 9.., it is possible to replace the non-return valve. These pumps are recognisable by their light-metal housing and centrally arranged suction and pressure fittings. See also VDT-W-438/500.

The non-return valve in question, together with the necessary O-ring, is available as a set under the part number 1 587 410 901.

Assembly

Clean the hose connection thoroughly at the pressure fitting and unscrew it.

Unscrew the non-return valve using a pin screwdriver (see Fig.).

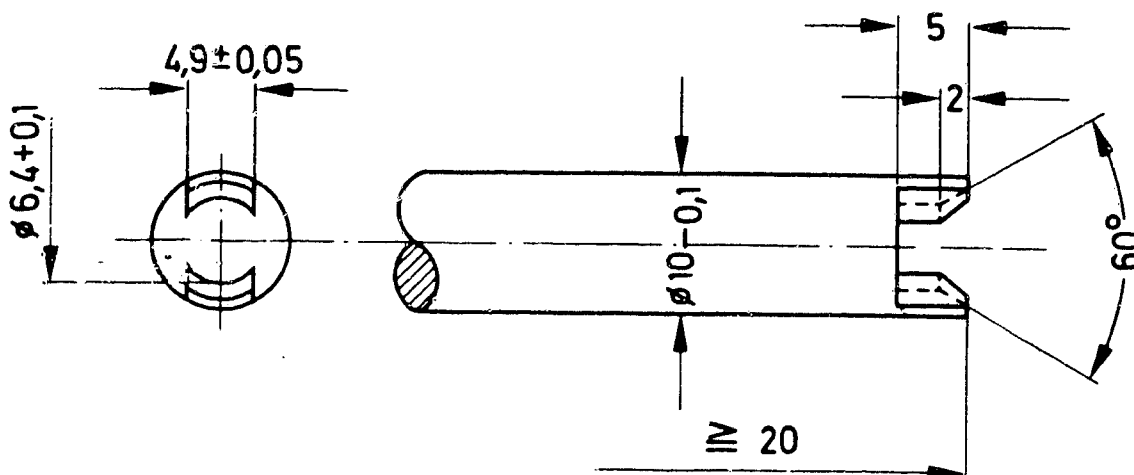
Screw in the new non-return valve.

Do not over-tighten. Tightening torque of 0.4...0.6 Nm (4...6 kgf/cm) is to be adhered to.

The thread is plastic. The non-return valve is sealed with an O-ring.

Tool

Manufacture the pin-type screwdriver yourself according to the sketch. It can also be made from a conventional screwdriver with a 9...10 mm blade.



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Saab 99, 900



After-sales Service

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SUPPLY PUMPS 0 580 ..

Overview of the non-return valves

438

VDT-I-438/104 En

9.1979

Replaceable non-return valves

Part Number	Appropriate seal ring	Fitted in supply pumps
1 583 385 004	1 580 203 002	0 580 254 990, ..991,..998
.. 006	.. 002	.. 985
1 583 386 008	.. 001	.. 987, ..988,..989
.. 011	.. 001	.. 986, ..996
.. 014	.. 001	.. 992
.. 016	1 580 105 001	.. 970, ..971,..972,
		.. 973, ..974,..980

Parts sets (comprising non-return valve complete with seal ring)

1 587 010 001	-	0 580 254 992
1 587 410 901	-	.. 978, ..982 <u>FD823</u> →

Supply pumps fitted with non-replaceable non-return valves

0 580 254 975, ..976, ..977, ..979 and ..982 → FD 822

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L4

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HOT-STARTING PROBLEMS

438

VDT-I-438/105 En

3.1980

K-Jetronic

Replaces Ed. 2.1980

Hot-starting problems can occur in various vehicles fitted with K-Jetronic. This means that when an engine is switched off whilst still hot and then switched on again after a short period, it does not start as well as it should.

The engine, the ignition system and the K-Jetronic system in these vehicles should be carefully checked. With the K-Jetronic particular attention should be paid to the:

complete system (in case of leaks),
injection valves (in case of leaks),
correct position of the air-flow sensor plate (rest position).

Instructions can be found in the vehicle-related repair manuals VDT-W-438/5...

If the engine still does not start satisfactorily when hot, even after checking, a timing relay can be fitted in K-Jetronic systems which are not equipped with a solenoid valve for reducing the control pressure as additional starting help.

Timing relay 0 340 000 003 controls the start valve during hot starts. The start valve then injects extra fuel intermittently (sometimes cutting out completely).

The timing valve is fitted according to the wiring diagram (see reverse side). The fitting of this relay will be charged for.

After fitting the timing relay starting should be carried out as follows:

Vehicles with start valve in intake manifold	- with open throttle valve,
Vehicles with <u>start valve in idle duct</u>	- with <u>closed throttle valve</u> .

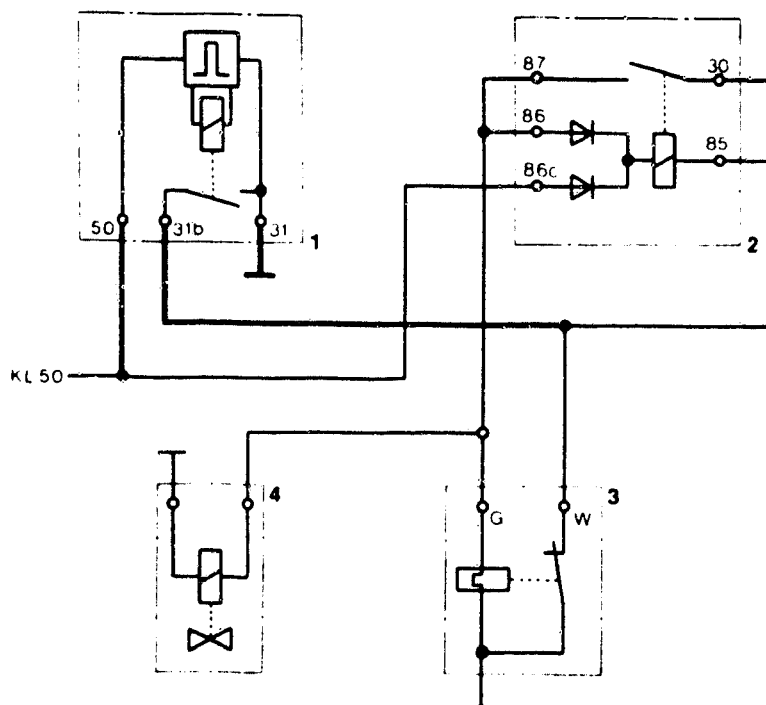
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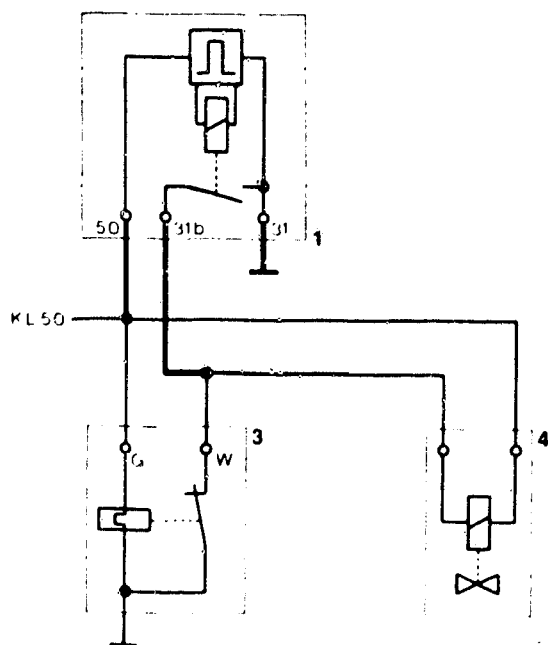
Technical Bulletin
Saab 99, 900





K-Jetronic system with post-injection relay

- 1 = Timing relay 0 340 000 003
- 2 = Post-injection relay
- 3 = Thermo-time switch
- 4 = Start valve



K-Jetronic system without post-injection relay



After-sales Service

Technical Bulletin

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TUBE FITTING WITH FILTER IN WARM-UP
REGULATOR 0 438 140 ...

VDT-I-438/106 En
4.1980

Warm-up regulator 0 438 140 065, used in MB 230 E, has a filter in the tube fitting for the fuel inlet to prevent dirt getting in.

When other warm-up regulators with the same connections give trouble or fail because of dirt getting in, then we recommend that you fit the new warm-up regulator with this tube fitting with filter, part no. 1 433 356 802.

During assembly a flat seal ring A 10 x 14 DIN 7603-C-CU, part no. 2 916 710 649, is laid underneath and the tube fitting is tightened with 20...22 Nm (2.0-2.2).

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After-sales Service

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FUEL PUMPS 0 580 254 9..

58

with replaceable non-return valve

VDT-I-580/100 En

9.1978

On various new-model fuel pumps 0 580 254 9.., it is possible to replace the non-return valve. These pumps are recognisable by their light-metal housing and centrally arranged suction and pressure fittings. See also VDT-W-438/500.

The non-return valve in question, together with the necessary O-ring, is available as a set under the part number 1 587 410 901.

Assembly

Clean the hose connection thoroughly at the pressure fitting and unscrew it.

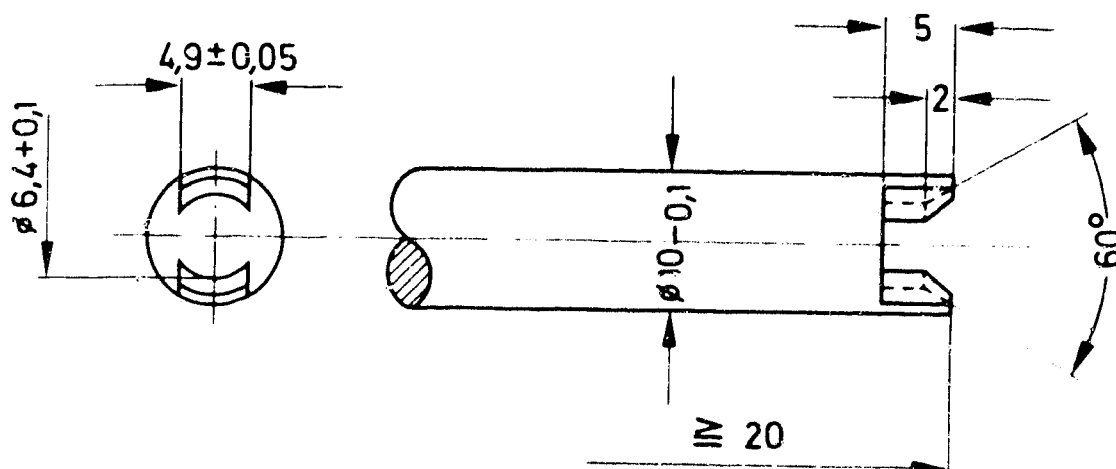
Unscrew the non-return valve using a pin screwdriver (see Fig.). Screw in the new non-return valve.

Do not over-tighten. Tightening torque of 0.4...0.6 Nm (4...6 kgf/cm) is to be adhered to.

The thread is plastic. The non-return valve is sealed with an O-ring.

Tool

Manufacture the pin-type screwdriver yourself according to the sketch. It can also be made from a conventional screwdriver with a 9...10 mm blade.



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Information technique

Saab 99, 900



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